HJR 31 ENERGY POLICY STUDY
MONTANA ENERGY DATA

Final Report to the 53rd Legislature of the State of Montana

January 1993

Prepared by the Montana Environmental Quality Council
and the
Montana Department of Natural Resources and Conservation

House Joint Resolution 31

ENERGY POLICY STUDY

MONTANA ENERGY DATA

December 1992

ENVIRONMENTAL QUALITY COUNCIL

HOUSE MEMBERS

Jerry Driscoll, Chair
Ed Grady
David Hoffman
Bob Raney

SENATE MEMBERS

Jerry Noble, Vice Chair
Steve Doherty
Dave Rye
Bill Yellowtail

PUBLIC MEMBERS

Doug Crandall
John Fitzpatrick
Mona Jamison
Helen Waller

GOVERNOR'S REPRESENTATIVE

Art Wittich

EQC STAFF

Deborah B. Schmidt, Executive Director
Todd Everts, Resource Policy Analyst/Attorney
Michael S. Kakuk, Staff Attorney
Paul Sihler, Resource Scientist
Ellen Engstedt, Administrative Officer
Maureen Theisen, Research Assistant

ACKNOWLEDGEMENTS

The Environmental Quality Council would like to acknowledge:

. . . Mr. Gerald Mueller, Energy Consultant, for his contribution to the preparation of this report. In particular, the EQC commends Mr. Mueller for his successful facilitation of the Residential Energy Efficiency Working Group.

. . . Ms. Gail Kuntz, former EQC Resource Specialist, for completion of the early phases of the HJR 31 Energy Policy Study.

. . . the Department of Natural Resources and Conservation, for their excellent cooperation in providing information for this report, especially for their compilation and production of Appendix H, "Montana Energy Data".

. . . the law firm of Murphy, Robinson, Heckathorn & Phillips, P.C., of Kalispell, for their completion of the Montana Energy Law Survey.

Table of Contents

Appendices

SUMMARY OF FINAL EQC RECOMMENDATIONS AND PROPOSED LEGISLATION

A summary of the HJR 31 Montana Energy Policy Study recommendations is listed below. The legislation the Environmental Quality Council has requested to implement these recommendations is presented in two bill drafts which appear in Appendix B.

ENERGY POLICY GOAL STATEMENT

Recommendation #1

The EQC recommends that the state adopt the following goal statement for Montana energy policy:

> The state should promote energy conservation, production, and consumption of a reliable and efficient mix of energy sources that represent the least social, environmental, and economic costs and the most long-term benefits to montana citizens. In pursuing this goal, the state should:
>
> A. Recognize that the state's energy system operates within the larger context of and is influenced by regional, national, and international energy markets; and
>
> B. Maintain a continuing process to review this energy policy statement and any future changes so that Montana's energy strategy will provide a balance between a sustainable environment and a viable economy.

ENERGY POLICY DEVELOPMENT PROCESS

Recommendation #2

The EQC recommends that the legislature create a continuing process modeled in part on the state water planning process for developing and modifying state energy policy.

ENERGY POLICY ANALYSIS METHODOLOGY

Recommendation #3

The EQC recommends that the legislature adopt an energy policy analysis methodology to inform the legislature and others of the cost/benefit implications of proposed energy legislation.

RESIDENTIAL ENERGY POLICY

Recommendation #4

The EQC endorses and recommends that the legislature adopt the following residential energy policy statement developed by a collaborative working group including broad representation of Montana groups and individuals interested in residential energy efficiency:

> The people of Montana have an interest in energy efficiency in residential buildings for the purpose of protecting and improving their economic and environmental well-being and energy security, while recognizing the basic need for safe and affordable shelter. It is, therefore, the policy of the state to encourage energy efficiency in residential buildings through strategies which ensure that:
>
> - The housing consumer has access to the information required to make informed choices about structures and energy efficiency measures;
> - Energy efficiency measures are safe, reliable, and readily available for use in Montana;
> - Investments in energy efficiency measures would be cost effective;
> - The impact of the cost of the energy efficiency measures on the combination of downpayments, monthly mortgages payments, and monthly utility bills, will not adversely affect the affordability of housing to prospective homebuyers and renters; and
> - The energy efficiency measures will not place an undue or inequitable burden on residential building owners or renters, the residential construction industry, financial institutions, real estate sales persons and appraisers, energy providers, or state and local governments.

RESIDENTIAL ENERGY POLICY IMPLEMENTATION STRATEGIES

Recommendation #5

The EQC recommends that state government in concert with the Montana housing industry, utilities and other interested or affected entities should continue to provide education, training, and technical assessment and demonstration programs regarding residential energy efficiency targeted at consumers and the infrastructure of the housing industry, including builders, building code officials, home inspectors, bankers, realtors, and appraisers.

Recommendation #6

The EQC recommends that the state require a "labeling sticker" describing the energy efficiency components, e.g. heating appliance efficiencies and ceiling, wall, floor, window, and door "R-or U-values", be permanently fixed to the breaker box of all new site built, modular and manufactured homes.

Recommendation #7

The EQC recommends that the state initiate developing and/or selection and testing of a home energy rating system applicable to new and existing residences. Subject to available funding, the system should be developed over the next two years in conjunction with the federal government.

Recommendation #8

The EQC recommends that the state support a petition from the real estate and housing industry to the Federal Home Administration (FHA) to increase the "caps", or upper limits, of FHA home mortgages.

Recommendation #9

The EQC recommends that the legislature appropriate non-general fund dollars, possibly such as federal oil overcharge funds, to establish a loan insurance pool that would allow the Board of Housing Program to increase the affordability of home mortgages to Montanans. The program would raise the mortgage ceiling levels above FHA caps without increasing the downpayment requirements above the 3-5% level. Federal income and other qualifying criteria would remain unaffected. A new requirement would be created to obtain mortgages above the FHA caps. The home would have to be built to higher energy efficiency levels than current building practice. Because utilities would benefit from the increased energy efficiency, they should also contribute dollars to the insurance pool.

Recommendation #10

The EQC recommends that Montana utilities offer incentive programs on a voluntary basis to purchase energy efficiency.

Recommendation #11

The EQC recommends that the legislature provide for enforcement of the energy code provisions of the state building code in single family through four-plex residential buildings located in areas outside of the jurisdictions of local governments adopting the state building code. This enforcement should be accomplished via a self-certification by home builders.

Recommendation #12

The EQC recommends that the energy code provisions of the state building code be reviewed this coming summer and raised to the levels agreed to by the residential energy efficiency working group, (see Appendix F) and that the code not be reviewed again until called for under the normal uniform building code review cycle.

INTRODUCTION

Early in 1991, national public attention became focused on energy security and energy efficiency issues as a result of the United States' entry into war in the Middle East. Concerns over uncertain energy supplies prompted increased legislative interest in the development of an official energy policy at both the national and state levels.

The 1991 Montana legislature responded by approving HJR 31 (see Appendix A), requiring the Environmental Quality Council (EQC) to develop recommendations to the legislature for a comprehensive state energy policy and options for its implementation. HJR 31 instructed the EQC, in cooperation with the Department of Natural Resources and Conservation (DNRC) and the Consumer Counsel, to develop the framework for a proposed state energy policy.[1] The framework was to include specific goals and recommended legislation to guide state programs relating to energy production, consumption, and conservation, and recommend assignments of responsibility to executive branch agencies for the implementation and administration of the proposed policy. HJR 31 also directed the EQC, DNRC, and Consumer Counsel to study: the state's potential for energy conservation; renewable and nonrenewable sources of energy available to the state; and existing energy programs in Montana and other states, the region, and the nation, including the influence of regional and national energy production, consumption, and conservation patterns upon Montana.

This report responds to the mandates of HJR 31. Through a series of consultations with numerous government agencies; energy producers and distributors; organizations and citizens having energy expertise or interest; and, with the able assistance from several task forces or working groups, the EQC has developed recommendations for:

- An energy policy goal statement;
- A continuing process for developing energy policy;
- An energy policy analysis methodology to be used by legislators and others to evaluate the implications of energy-related legislation; and
- A specific policy and implementing strategies for increasing the efficiency of Montana residences.

To provide a context for these recommendations, this report also contains a summary of an inventory of existing state energy-related law and a summary compilation of available data on the production and consumption of energy in Montana by type and end use prepared by the Montana Department of Natural Resources and Conservation.

---

[1] Because the legislature appropriated no additional moneys to conduct the required study, the EQC, DNRC, and Consumer Counsel's response to HJR 31 was constrained by existing budget and staff.

SECTION I.

ENERGY POLICY GOAL STATEMENT

A. BACKGROUND

The EQC initiated its study of energy policy by creating a Study Design Working Group (Study Group) and charging it with drafting a work plan to guide the effort. The Study Group was chosen to be broadly representative of energy producers, distributors, consumers, state agencies, low-income and environmental groups and others interested in state energy policy. A list of the members of the Study Group is found in Appendix C.

Because of the financial and time constraints on this study, the Study Group did not recommend developing a comprehensive state energy policy. Instead, it proposed a work plan that addressed the following elements: an energy policy goal statement; the design of an ongoing energy policy development process; an energy policy analysis methodology; and selected energy policy development topics including Montana's energy end uses, energy conservation, and motor vehicles/transportation. For any of the selected topics chosen, the Study Group suggested that three questions be addressed: 1) What is the State of Montana doing now? 2) What could the state do? 3) What should the state do?

The EQC approved the portions of the work plan addressing all but the selected energy topics, which were deferred pending identification of necessary funding and staffing resources.[2]

After receiving and discussing a proposed goal statement from the Study Group, the EQC adopted the following statement for recommendation to the 1993 legislature:

---

[2] Later on in the interim, the EQC selected the topic of residential energy efficiency for policy development. (See Section V.)

B. RECOMMENDATION

Recommendation #1:

The state should promote energy conservation, production, and consumption of a reliable and efficient mix of energy sources that represent the least social, environmental and economic costs and the most long-term benefits to Montana citizens. In pursuing this goal, the state should:

A. Recognize that the state's energy system operates within the larger context of and is influenced by regional, national, and international energy markets; and

B. Maintain a continuing process to review this energy policy statement and any future changes so that Montana's energy strategy will provide a balance between a stable environment and a viable economy.

SECTION II.

ENERGY POLICY DEVELOPMENT PROCESS

A. BACKGROUND

Historically, many of Montana's energy policies, and particularly coal-related policies, have been developed via combat between interested parties. The forum for this policy development has generally been the legislature, although the courts, and executive branch agencies such as the Board of Natural Resources and Conservation and the Public Service Commission have made important decisions as well. Policy has been made primarily in an ad hoc rather than comprehensive mode, and few if any policies have been reviewed for effectiveness and contemporary relevance.

The Study Design Working Group recommended to the EQC that some of these aspects of Montana's energy policy making process should be preserved and some changed. Because the legislature is the constitutional mechanism through which the people of Montana set public policy, the Study Group recommended that it should remain the primary energy policy decision forum. The Study Group also recommended that energy policy development should continue to be ad hoc rather than comprehensive in nature because attempts to create the latter tend to degenerate into disputes over symbols and ideologies at the expense of solving actual problems. Even if the symbolic and ideological disputes were resolved and a "comprehensive" policy proposal developed, it probably would not have sufficient public interest or backing to translate it into comprehensive implementing legislation. Energy policies should continue to be made in response to the identification of specific problems or challenges related to the production, distribution, and consumption of energy.

The major change recommended by the Study Group was the creation of a process modeled on the existing, successful state water planning process through which interested members of the public could work together to develop consensus-based policy proposals for disposition by the legislature. Such a mechanism would have three primary advantages over historic circumstances: first, it would reduce the rancor and conflict which has surrounded many policy initiatives; second, it would produce a more informed consideration by the legislature of policy choices; and third, policy initiatives generated by it would likely be supported by the coalition of interests necessary to obtain both legislative action and implementation of that action. A consensus-based mechanism could make a difference by leading to resolution of real problems.

To achieve these objectives the mechanism must:

- Be open and include participation by all interested parties;
- Allow these parties to work together in a structured process so they can understand each other's motivations, concerns, and goals;
- Allow the parties to influence selection of issues of concern as well as identify and evaluate alternative solutions to them;

- Include participation by legislators who could then advocate the group's recommendations to the legislature; and
- Be supported by state agency expertise capable of providing the information and analysis necessary for the group to identify and analyze policy alternatives.

This process would also provide the opportunity to evaluate the effectiveness of Montana's existing energy policies. Historically, if an existing policy has been reviewed, the review has occurred when a legislative proposal was made to change it. However, it is too much to expect time-pressured legislators to conduct a thorough, informed, and objective look at policy effectiveness. The policy making mechanism should and can also be used to review periodically the effectiveness and relevance of existing energy policies.

B. RECOMMENDED ENERGY POLICY DEVELOPMENT PROCESS

Recommendation #2:

The EQC recommends that the legislature create a continuing process modeled in part on the state water planning process for developing and modifying state energy policy.

Based on the recommendations of its Study Group and public comments, the EQC recommends that the legislature create the continuing energy policy process shown schematically in Figure 1. This process is modeled on the state water planning process which has successfully involved the interested public, executive and legislative branches in consensus-based water planning and policy making. Draft legislation implementing this recommendation is contained in Appendix B (Draft Bill #1).

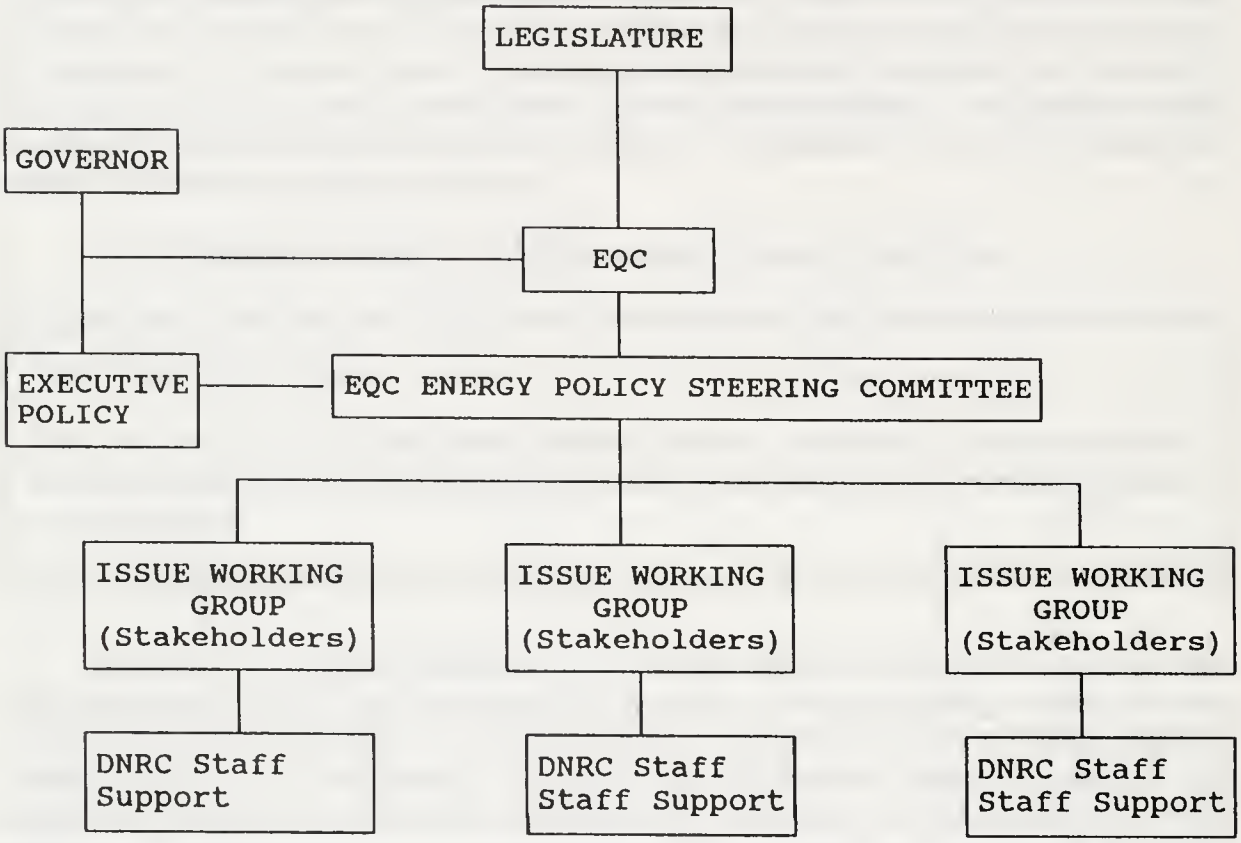
Overall responsibility for development of energy policy would reside in the EQC and the Montana Department of Natural Resources and Conservation (DNRC). The EQC, based on the recommendations of the DNRC and the public, would identify specific components of the state's energy policy needing development. Oversight of the development would reside in an energy policy steering committee, a subcommittee of the EQC with possible representation from other entities. The steering committee would then assign an issue Study Group composed of representatives of the parties with a stake in the specific component the task of developing consensus recommendation for that component of energy policy. At its discretion, the EQC would forward energy policy recommendations to the legislature and appropriate executive branch agencies for adoption.

Technical, administrative and logistical support of the issue Study Groups would be supplied by the Energy Division of the DNRC. Since the Energy Division is the

state entity in which energy policy and technical expertise now resides, their support of the issue working groups would result in the lowest costs to the state.

Figure 1

Energy Policy Making Organizational Chart



SECTION III.

ENERGY POLICY ANALYSIS METHODOLOGY

A. BACKGROUND

In addition to creating an ongoing energy policy development process that would involve stakeholders and the public in addressing issues of energy policy as they arise, the Study Design Working Group also recommended that the EQC develop an energy policy analysis methodology that would inform legislators and others regarding the implications of energy-related legislation. The analysis would identify the potential costs and benefits of energy proposals to society in a manner similar to fiscal notes used by the legislature to project the fiscal impacts of proposed legislation.

The EQC accepted the Study Design Working Group's recommendation and appointed a separate working group, the EQC Energy Policy Analysis Methodology Working Group (Methodology Working Group) to develop a methodology. Members of the Methodology Working Group were chosen to be broadly representative of Montana energy producers and consumers and are listed in Appendix D. This working group was assisted by the staff of the DNRC.

B. RECOMMENDED ENERGY POLICY ANALYSIS METHODOLOGY

Recommendation #3:

The EQC recommends that the legislature adopt an energy policy analysis methodology to inform the legislature and others of the cost/benefit implications of proposed energy legislation.

At the recommendation of the Methodology Working Group, the EQC proposes that the 1993 and subsequent legislatures conduct cost/benefit analyses of proposed energy-related legislation using the specific methodology explained in Appendix E. The methodology consists of two parts, an Energy Policy Evaluation Worksheet and an Effects Summary Table. The purpose of the Worksheet is to describe all of the potential energy, economic, environmental, social, and fiscal effects of a given legislative proposal in detail. The Summary Table would be used to summarize the effects of the proposal in concise, comprehensive terms.

The methodology itself is not intended to dictate any predetermined conclusions or to make energy policy decisions for the legislators. It is designed to serve a role similar to that of a fiscal note and can be prepared by a variety of people, individuals or groups who are also involved in the preparation of fiscal notes. Different individuals and organizations may come to different conclusions using the methodology. The methodology is not intended for administrative rule making.

SECTION IV.

MONTANA ENERGY LAW SURVEY

A. BACKGROUND

The work plan for the energy policy study proposed to the EQC by the Study Design Working Group also included as a selected energy policy topic the evaluation of the effectiveness of Montana's existing energy efficiency statutes and regulations. Based on this suggestion, the Montana Office of the Northwest Power Planning Council agreed to fund a more general survey of all Montana energy statutes and regulations. The survey was conducted by the law firm of Murphy, Robinson, Heckathorn & Phillips, P.C. of Kalispell, Montana. The report, entitled "Montana Energy Law Survey," which attempted to catalogue and summarize all Montana statutes and regulations addressing energy, is available as Appendix G of this report. The following summary of existing Montana energy policies is based on the "Montana Energy Law Survey".

B. SUMMARY OF MONTANA ENERGY POLICY

No formal, comprehensive state energy policy has been codified in statute. A number of laws addressing energy topics have been adopted which reflect specific energy policies. A summary of these policies, grouped by related topic and comments on their gaps and inconsistencies follows.

1. Non-Renewable Energy Resources and Conversion and Transmission Facilities

Policy: Montana regulates and seeks through taxation to compensate the people of Montana for the development of non-renewable energy resources including coal, oil and natural gas, and uranium.

Regulation of the state's energy resources includes requirements for land reclamation and the prevention of air and water pollution during resource development. Air and water regulations include both emission and ambient standards. For water with existing quality higher than ambient standards, energy development must not degrade the higher quality unless certain conditions are met.

Energy conversion and transmission facilities larger than certain capacities and fueled by or transmitting non-renewable resources, including coal, oil and natural gas, and uranium, are also subject to regulation. This regulation determines whether and how much of Montana's environment will be allocated to their development. Uranium conversion facility regulation is designed to discourage facility construction and operation in the state until specific conditions are met.

In recent years, severance and other taxes on coal, oil and natural gas have been reduced in an attempt to preserve or stimulate development of these resources.

2. Renewable Energy Resources and Cogeneration

Policy: Montana seeks to encourage and regulate the development of renewable energy resources including hydro, solar, geothermal, and wind power and cogeneration.

One method the state uses to encourage and regulate renewable energy resource development is through state statutes. These statutes remove specific barriers to development, e.g. by providing for solar and wind easements and by requiring purchases of the output of small renewable electricity generating resources by utilities. The state also seeks to stimulate development of renewable resources through tax incentives and research and demonstration grants. As is the case for non-renewable resources, Montana statutes also provide for the regulation of renewable resource energy conversion facilities larger than certain capacities by requiring a determination of whether and how much of the state's environment will be allocated to their development.

3. Conservation

Policy: Montana seeks through regulation, investments, grants and loans, and tax incentives to encourage energy conservation.

State statutes require conservation through building codes and direct the Public Service Commission to allow rate treatment for certain utility investments in residential energy conservation. The state Board of Examiners is authorized to sell bonds to finance energy conservation in state-owned buildings, structures, and facilities. Research and demonstration grants and loans are authorized and tax incentives are offered to individuals and corporations in support of energy conservation.

4. Energy Emergency Powers

Policy: In times of emergency, the state is granted powers to reduce or allocate the usage of energy.

State statutes authorize the governor and/or other state agencies to plan for, gather information, and take action to reduce or allocate the usage of energy during specified emergency conditions.

5. Low-Income Energy Assistance Programs

Policy: The state is authorized to assist low-income people with meeting their energy needs.

State statutes authorize expenditure of federal dollars for the low-income home energy assistance program and low-income weatherization program. No state general funds are expended on these programs.

6. Policy Gaps and Inconsistencies

The two most conspicuous gaps related to state energy policy evident from the survey are addressed by the recommendations from this study: creation of a continuing energy policy development process and a methodology for analyzing the costs and benefits of proposed energy policies and statutes. A third gap identified is the lack of analysis of the costs and benefits of existing statutes and programs which provide incentives to achieve specific policy ends, e.g. tax incentives and grant and loan programs.

In addition to gaps in the state's energy policy, the study also identified a policy inconsistency - the use of severance taxes to maintain trust funds to compensate Montanans for the consumption of non-renewable resources or damages caused by their development - and recent actions to reduce those severance taxes to maintain or spur development of the same resources.

While not necessarily a gap or an inconsistency, two policies should be examined for possible unintended consequences. The first involves the regulation of both renewable and non-renewable energy facilities larger than certain sizes via the Major Facility Siting Act to determine whether and how much of Montana's environment will be allocated to the facility development and operation. The size cutoff for regulation may be uneconomically skewing the size of facilities developed, particularly in the case of non-renewable resources. The second policy involves the practice of diverting at least 5% of federal funds from the low-income home energy assistance program (LIHEAP) to low-income weatherization. LIHEAP is a welfare program that makes payments to low-income Montanans to assist them in paying their energy bills. This diversion, particularly in light of the continuing reduction of federal dollars for LIHEAP, may be short changing low-income people's immediate need for utility bill assistance. The state may wish to end this diversion and thereby concentrate its limited fiscal resources (i.e. federal dollars) on the welfare mission of energy bill assistance to maintain access of low-income people to basic levels of heating. The longer term energy efficiency mission could still be met by assigning low-income weatherization to utilities.

Although an environmental policy as opposed to an energy policy, the water quality non-degradation statute is apparently unclear and controversial. The meaning of the conditions under which reductions in water quality are allowable should be clarified so that they can be understood by regulators and potential energy developers.

SECTION V.

RESIDENTIAL ENERGY EFFICIENCY COLLABORATIVE

A. Background

1. Residential Energy Use

Approximately 14% of the energy consumed in Montana is used in the state's residences for space and water heating, lighting, and appliances. Space heating is the largest category of residential energy use accounting for as much as 40-50% of total residential use. The amount of energy used for space heating is a function of the energy efficiency of the building structure, the efficiency of the building heating system, and the temperature at which people maintain the building.

State law now requires that buildings be designed to achieve energy efficiency. Sections 50-60-201, 202 and 203, MCA require the Department of Commerce to adopt a building code with the following specific energy related objectives and standards:

> (2) permit to the fullest extent feasible the use of modern technical methods, devises, and improvements which tend to reduces the cost of construction consistent with reasonable requirements for the health and safety of the occupants or users of buildings, and, **consistent with the conservation of energy, by design requirements and criteria that will result in the efficient utilization of energy, whether used directly or in a refined form, in buildings.**
>
> (5) encourage **efficiency of design and insulation which enable buildings to be heated in the winter with the least possible quantities of energy and to be kept cool in the summer without air conditioning equipment or with the least possible use of such equipment.**
>
> (6) encourage **efficiencies and criteria directed toward design of building envelopes with high thermal resistance and low air leakage and toward requiring practices in the design and selection of mechanical, electrical, and illumination systems which promote the efficient use of energy.** (50-60-201, MCA) (Emphasis added).

While the mandate to address energy efficiency is clear, the specific level of energy efficiency which the building code must achieve is left to the discretion of the Department of Commerce. This level has been controversial, at least since 1983 when the Northwest Power Planning Council promulgated and urged the states of Montana, Idaho, Oregon, and Washington to adopt the Northwest Energy Code for electrically heated homes. The Northwest Energy Code incorporates efficiency levels which substantially exceed the levels of Montana's building codes.

2. Residential Energy Efficiency Collaborative

Early in 1992, Pacific Power & Light (PP&L) and the Montana Power Company (MPC) suggested that the EQC form a collaborative group as a part of the HJR 31 energy policy study to attempt to resolve the controversy surrounding residential energy efficiency and energy codes. Montana's investor-owned utilities[3] and the Bonneville Power Administration (BPA) agreed to fund the collaborative, including the hiring of a group facilitator. Using utility and BPA funding only, the EQC established the collaborative and charged it with developing consensus recommendations for policies and implementation strategies to achieve increased residential energy efficiency.

The participants in the collaborative, which became known as the Residential Energy Efficiency Working Group (REEWG), were self-selected. Anyone wishing to participate in the REEWG could do so. Participants, which are listed in Appendix F, represented a broad range of interests including utilities, home builders, home building suppliers, home lenders, architects and engineers, environmental groups, low-income groups, local governments, and state and federal agencies.

As a result of nine meetings held from July through December 1992, the REEWG agreed unanimously to the following residential energy policy statement and a package of recommended strategies to implement it.

[3] The investor-owned utilities supplying funding included Montana Power Company, PacifiCorp, Montana Dakota Utilities, and Great Falls Gas Company.

Recommendation #4:

The people of Montana have an interest in energy efficiency in residential buildings for the purpose of protecting and improving their economic and environmental well-being and energy security, while recognizing the basic need for safe and affordable shelter. It is, therefore, the policy of the state to encourage energy efficiency in residential buildings through strategies which ensure that:

- The housing consumer has access to the information required to make informed choices about structures and energy efficiency measures;
- Energy efficiency measures are safe, reliable, and readily available for use in Montana;
- Investments in energy efficiency measures would be cost effective;
- The impact of the cost of the energy efficiency measures on the combination of downpayments, monthly mortgages payments, and monthly utility bills, will not adversely affect the affordability of housing to prospective homebuyers and renters; and
- The energy efficiency measures will not place an undue or inequitable burden on residential building owners or renters, the residential construction industry, financial institutions, real estate sales persons and appraisers, energy providers, or state and local governments.

IMPLEMENTATION STRATEGIES

Information Strategies

I-1.

Recommendation #5:

The EQC recommends that state government in concert with the Montana housing industry, utilities and other interested or affected entities should continue to provide education, training, and technical assessment and demonstration programs regarding residential energy efficiency targeted at consumers and the infrastructure of the housing industry, including builders, building code officials, home inspectors, bankers, realtors, and appraisers.

I-2.

Recommendation #6:

The EQC recommends that the state require a "labeling sticker" describing the energy efficiency components, e.g. heating appliance efficiencies and ceiling, wall, floor, window, and door "R-or U-values", be permanently fixed to the breaker box of all new site built, modular and manufactured homes.

I-3.

Recommendation #7:

The state should initiate developing and/or selection and testing of a home energy rating system applicable to new and existing residences. Subject to available funding, the system should be developed over the next two years, in conjunction with the federal government.

Financial Strategies

F-1.

Recommendation #8:

The state should support a petition from the real estate and housing industry to the Federal Home Administration (FHA) to increase the "caps", or upper limits, of FHA home mortgages.

F-2.

Recommendation #9:

The Montana Board of Housing should initiate a residential energy efficient mortgage program available to qualifying, first time home buyers which would maintain a low (3-5%) downpayment requirement and raise the mortgage ceiling level above FHA caps. The Board of Housing risk exposure for the loan amount above the FHA cap would be assumed in some manner by utilities, state government, or a non-profit entity.

Energy Provider Strategies

EP-1.

Recommendation #10:

Utilities should, on a voluntary basis, offer incentive programs to purchase energy efficiency.

Building Code Strategies

BC-1.

Recommendation #11:

The state should provide for enforcement of the energy code in single family through four-plex residential buildings located in areas outside of the jurisdictions of local governments adopting the state building code via a self-certification by home builders. The Building Code Bureau of the Department of Commerce should have no role in enforcing the energy code in areas where the self-certification would apply. The recommendation to extend the energy code to areas of the state where it is not now enforced is contingent on establishment of the housing affordability program described in recommendation F-2.

BC-2.

Recommendation #12:

The energy code should be reviewed this coming summer and raised to the following consensus level, and then the code should be reviewed on the normal code review cycle, i.e. every three years.

	Current Code	Proposed Code Prescriptive Path*	Proposed Code Equivalent Path*
Roof	R-38	R-42	R-38
Walls	R-19	R-21	R-19
Doors	R-2	R-5	R-2
Grade Basement Foundation	 R-10 R-19	 R-11 R-19	 R-10 R-19
Floor	R-19	R-19	R-19
Windows	Double Glazing	U-0.5 (Double Glazing)	U-0.4 (Double (Glazing)

B. Recommendations

At its January 1993 meeting, the Council discussed and endorsed the REEWG's recommendations concerning residential energy policy and implementing strategies. The Council forwarded these recommendations, as well as a draft bill providing for their statutory authorization (see Appendix B, Draft Bill #2), to the current legislature.

SECTION VI.

MONTANA ENERGY DATA

Any study of state energy policy requires an appreciation of Montana energy production and consumption. The Montana Department of Natural Resources and Conservation has compiled a comprehensive report on Montana energy production and consumption by fuel type and end use sector entitled "Montana Energy Data Handbook". State energy production and consumption information will be briefly summarized here via excerpts from chapter 1 of the DNRC report; the full DNRC report is included in Appendix H.

When considering state energy data and policies, it is important to consider that Montana is an integral part of an inter-state and international energy system. Much of the energy produced within the state in the form of oil, natural gas, coal, and electricity is exported out of state. Although a substantial energy exporter, Montana also imports through pipelines and transmission lines much of the fuels consumed within the state.

A. Energy Production

Montana produces coal, natural gas and crude oil fuels which are used directly or are converted into other forms of energy. The 1991 production of these fuels, plus electricity from hydroelectric dams and from plants that burn wood, was equivalent to 890 trillion British thermal units (Btu) of energy. This down from a high of 915 trillion Btu in 1988, but still 1.7 percent higher that 1990. For comparison, Montana's 1990 production was a little over one percent of the United States' 81,151 trillion Btu consumption in the same year.

Coal is the source of most of the energy produced in Montana. In 1991, three-quarters of the energy produced in Montana was in the form of coal. Over the last decade, coal production increased from 28 million tons in 1982 to almost 39 million tons in 1988, before sliding back slightly to less than 38 million tons in 1991. That year, around 90 percent of the coal mined was exported, either by rail or by transmission line after conversion to electricity.

Montana also produces significant amounts of crude oil, natural gas, and hydroelectricity. Crude oil has declined since the peak year of 1968, reaching a thirty year low in 1991 of 19.6 million barrels, 40 percent below peak. Natural gas production has been more varied, but over the past decade has stayed around 51 million cubic feet. Hydroelectric production varies from year to year, depending on the amount of precipitation. Since Libby Dam, the last big dam, was completed in 1975, production has varied between 8,500 million kilowatt hours (kwh) and 12,400 million kwh. Production in 1991 was 11,900 million kwh.

B. Energy Consumption

The industrial and transportation sectors have long been the largest consumers of energy in Montana. In 1990, the industrial sector purchased 41 percent of the total energy sold in Montana, the transportation sector 34 percent, residential 14 percent, and commercial 11 percent.

Industrial consumption climbed until the end of the 1970's, then dropped as the Montana economy was restructured. The winding down of the Anaconda Company operations in Montana a decade ago was particularly significant. Transportation energy use peaked in 1979, the year of the Iran crises, then declined, and has remained more or less stable in recent years. Residential use hasn't changed much in the last ten years. By 1990, it still was less than during the 1970's, in spite of modest growth in population and economic activity. The same generally was true of the commercial sector.

In very broad terms, the residential and the commercial sector rely primarily on natural gas and electricity. The industrial sector relies on petroleum and electricity. The transportation sector uses petroleum almost exclusively.

HOUSE JOINT RESOLUTION NO. 31

INTRODUCED BY RANEY, DOHERTY, GILBERT, GRADY, DRISCOLL

A JOINT RESOLUTION OF THE SENATE AND THE HOUSE OF REPRESENTATIVES OF THE STATE OF MONTANA DIRECTING THE ENVIRONMENTAL QUALITY COUNCIL TO STUDY ENERGY RESOURCES AND ENERGY USE IN MONTANA AND TO DEVELOP A PROPOSED STATE ENERGY POLICY IN COOPERATION WITH THE DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION AND THE CONSUMER COUNSEL; AND DIRECTING THE ENVIRONMENTAL QUALITY COUNCIL TO REPORT ITS FINDINGS TO THE 53RD LEGISLATURE.

WHEREAS, while Montana has an extensive number of laws and programs designed to promote the production, consumption, and conservation of various sources and forms of energy, Montana does not have a comprehensive state energy policy; and

WHEREAS, Montana has substantial renewable and nonrenewable resources that are important for the production of electricity, liquid fuels, heat, and other energy forms for use within and outside of the state; and

WHEREAS, although there is no comprehensive national energy policy, many aspects of energy production, consumption, and conservation in Montana are determined or strongly influenced by national programs and legislation; regional, national, and international market factors; and national and regional energy production and distribution systems; and

WHEREAS, the nation's dependence on imported crude oil and the United States' entry into war in the Middle East have raised substantial public concern about the need for a national energy policy; and

WHEREAS, new electric power generating capacity or new energy conservation, or both, may be needed in the Pacific Northwest region in the near future to meet projected demands for electricity; and

WHEREAS, energy production and consumption have substantial economic value to the state and substantial social and environmental costs; and

WHEREAS, the Legislature and the Executive Branch of state government do not have a comprehensive analysis of the renewable and nonrenewable sources of energy available to the state; the economic, social, and environmental factors influencing production, consumption, and conservation of the various sources and forms of energy in the state; and specific aspects of energy production, consumption, and conservation that can be significantly influenced by state policies and programs; and

WHEREAS, THE DEPARTMENT OF NATURAL RESOURCES AND

CONSERVATION, ENERGY DIVISION, AND THE CONSUMER COUNSEL HAVE CONSIDERABLE EXPERTISE AND INFORMATION RELATED TO ENERGY PRODUCTION, CONSUMPTION, AND CONSERVATION IN MONTANA; AND

WHEREAS, the state should promote energy conservation and the production and consumption of an appropriate mix of energy sources that are reliable and efficient and that represent the least social, environmental, and economic costs and the most benefits to the state and its citizens over the long term.

NOW, THEREFORE, BE IT RESOLVED BY THE SENATE AND THE HOUSE OF REPRESENTATIVES OF THE STATE OF MONTANA:

That the Environmental Quality Council, IN COOPERATION WITH THE DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION AND THE CONSUMER COUNSEL, be assigned to:

(1) study the current energy conservation patterns in the state, the forms and amounts of energy conservation available to the state that are not being used, and options for increasing the amount of energy conserved by the state's citizens and all sectors of the state's economy;

(2) study the renewable and nonrenewable sources of energy available to the state and patterns of energy production and consumption in the state, including but not limited to energy sources and forms such as liquid fuels, natural gas, coal, electricity, biomass, solar, wind, wood,

and geothermal;

(3) study existing programs in Montana and programs and legislation in other states, the region, and the nation relating to the production, consumption, and conservation of energy, including the influence of regional and national energy production, consumption, and conservation patterns upon Montana;

(4) develop the framework for a proposed state energy policy that is designed to provide reliable and efficient energy supplies with the least social and environmental cost to the state and its citizens over the long term, including:

(a) specific goals and recommended legislation to guide the development of state programs relating to energy production, consumption, and conservation; and

(b) recommended assignments of responsibility to specific agencies within the Executive Branch of state government for the implementation and administration of the various elements of the proposed policy; and

(5) develop the framework for a proposed state energy policy in consultation and cooperation with state and federal agencies, the Pacific Northwest Electric Power and Conservation Planning Council, the Public Service Commission, Indian tribes, units of local government, energy producers and distributors, and organizations and citizens with energy-related expertise or interests in the study and

development of the proposed state energy policy.

BE IT FURTHER RESOLVED, that the Environmental Quality Council report the findings of the study to the 53rd Legislature, including recommendations for a comprehensive state energy policy and options for implementation of the proposed policy by the Legislature.

-End-

APPENDIX B

BILL DRAFT #1

**** Bill No. ***

Introduced By **********

By Request of **********

A Bill for an Act entitled: "An Act adopting a state energy policy goal statement; providing for an ongoing state energy policy development process; and providing for the application of an energy policy analysis methodology for energy related legislation."

Be it enacted by the Legislature of the State of Montana:

NEW SECTION. **Section 1. State energy policy goal statement.** (1) It is the policy of the state of Montana to promote energy conservation, production, and consumption of a reliable and efficient mix of energy sources that represent the least social, environmental, and economic costs and the most long-term benefits to Montana citizens.

(2) In pursuing this goal, it is the policy of the state of Montana to:

(a) recognize that the state's energy system operates within the larger context of and is influenced by regional, national, and international energy markets; and

(b) maintain a continual process to review this energy policy statement and any future changes to it toward the end that Montana's energy strategy will provide for a balance between a sustainable environment and a viable economy.

NEW SECTION. **Section 2. Definitions.** As used in [sections 3 and 4], the following definitions apply:

(1) "Council" means the environmental quality council established in 5-16-101.

(2)"Department" means the department of natural resources and conservation established in 2-15-3301.

NEW SECTION. **Section 3. Energy policy development process.**

(1) The department and the council, in cooperation with the consumer counsel, shall maintain a continual process to develop the components of a comprehensive state energy policy.

(2) Because of limited state resources and the need to focus intensive effort on specific issues of importance, the development of a comprehensive state energy policy must occur on an incremental basis. As the need arises, the department, in cooperation with the appropriate state agencies and with extensive public involvement, shall identify and recommend to the council specific components of a state energy policy for development under the consensus process described in subsection (3).

(3)(a) Upon selection of a specific energy policy component, the council shall assign a working group composed of representatives of the parties with a stake in that specific component the task of developing consensus recommendations for that component of state energy policy.

(b)The working group must include the broadest possible representation of stakeholders in the issues to be included within the specific component of state energy policy.

(c) The working group shall use a consensus process whenever possible to develop recommendations for a specific energy policy component to be submitted to the council. Recommendations that are not based upon consensus must be so noted by the working group. Upon consideration of the working group's recommendations, the council shall forward its recommendations to the legislature and to the appropriate state agencies for adoption.

(d) the department shall:

(i) provide staff support to the working group, including policy analysis, data-gathering, research, technical analysis, and administrative support;

(ii) provide administrative coordination among the appropriate state agencies in the energy policy development process;

(iii) prepare reports for and make recommendations to the council; and

(iv) consult regularly with the council to coordinate each agency's activities.

(4) In carrying out their responsibilities under this section, the department and the council may contract with experts, consultants, and facilitators and may seek funding from a variety of private and public sources for technical and other assistance necessary to accomplish their responsibilities.

NEW SECTION. **Section 4. Application of energy policy analysis methodology for energy related bills.** (1) All bills reported out of a committee of the legislature that would affect state energy policy, including the consumption, production, and

conservation of the state's energy resources, {shall} {may} include an energy policy analysis that evaluates the costs and benefits of that bill.

(2) The analysis shall include:

(a) an energy policy evaluation worksheet, which consists of:

(i) a description of the bill;

(ii) identification of the problems or issues addressed by the bill;

(iii) an explanation of the intent of the bill; and

(iv) an evaluation of the bill's effects on energy, the environment, and the economy along with information on the fiscal effects, social effects, and the distribution of the potential effects among different income groups, sectors of the economy, and geographic areas; and

(b) an effects summary table that reviews the information provided in the energy policy evaluation worksheet in summary form.

(3) An energy policy analysis may also be requested on a bill, as the joint rules of the house of representatives and the senate may allow, by:

(a) a committee considering the bill;

(b) a majority of the members of the house in which the bill is to be considered, at the time of second reading; or

(c) the sponsor, through the presiding officer.

(4) The department, in cooperation with other appropriate state or local agencies, shall prepare the energy policy analysis,

within the limits of available resources, within 6 days or as soon as reasonably practicable.

-END-

{Deborah B. Schmidt
Drafter, 444-3742}

BILL DRAFT #2

**** Bill No. ***

Introduced By **********

By Request of Environmental Quality Council

A Bill for an Act entitled: "An Act establishing a policy on residential energy efficiency; providing for the applicability of the energy conservation provisions of the state building code to all residential buildings; requiring that the adoption of rules for energy conservation in buildings conform to certain policies; providing for the certification of installation of energy efficiency features by builders; providing for the labelling of energy efficiency features in new homes; and amending sections 50-60-102 and 50-60-203, MCA."

WHEREAS, the Environmental Quality Council, as part of its study of energy policy under the requirements of HJR 31, adopted in the 1991 legislative session, created a Residential Energy Efficiency Working Group (Working Group) to address a long-standing controversy surrounding residential energy efficiency and specifically the energy provisions of the state building code; and

WHEREAS, the Working Group included broad representation from energy utilities, the home building industry, energy consumers, state and local governments, the lending and real estate industries, low income and conservation groups, and the building supply industry; and

WHEREAS, the Working Group met nine times during the 1992 interim and agreed that any final recommendations must be adopted

by consensus and supported by all participants as a package, all elements of which should be adopted, or none at all; and

WHEREAS, the Working Group adopted by consensus the policy statement embodied in [section 1] and then adopted by consensus a package of implementation strategies; and

WHEREAS, the implementation strategies include:

(1) information strategies for consumers, builders, building code officials, home inspectors, bankers, realtors, and appraisers; specifically encompassing education, training, and technical assessment and demonstration of conservation measures, as well as an energy labelling sticker and initiation of first steps toward a home energy rating system;

(2) financial strategies geared toward making energy efficient new homes more affordable, including: (a) petitioning the Federal Home Administration (FHA) to increase the upper limits of FHA home mortgages; (b) initiating a residential mortgage program for energy efficient homes in the Montana Board of Housing that would maintain a low downpayment requirement and raise mortgage ceiling levels above FHA limits; and (c) establishing a loan reserve account in the department of natural resources and conservation that allows the Board of Housing to sell bonds to enable it to offer loans above the FHA limit and that would be funded by homebuyers, utilities and the state of Montana as provided in [HB 10];

(3) energy provider strategies in which utilities would continue to offer on a voluntary basis incentive programs to purchase energy efficiency; and

(4) building code strategies, including enforcement of the energy conservation provisions of the state building code in all residential buildings through a combination of builder self-certification and state and local government enforcement for those residences currently subject to the state building code, as well as raising the energy code according to the consensus levels adopted by the working group; and

WHEREAS, it is the consensus of the working group that implementation of the building code strategies relating to the applicability of the energy code to all residences is contingent on the establishment, funding, and operation of the financial strategy concerning the Board of Housing program promoting the affordability of energy efficient new homes; and

WHEREAS, [this act] embodies those consensus recommendations of the Working Group requiring statutory authorization.

Be it enacted by the Legislature of the State of Montana:

STATEMENT OF INTENT

A statement of intent is necessary for this bill because it directs the department of commerce, in adopting rules pertaining to energy conservation in buildings under the provisions of 50-60-203, to conform those rules to the policy provided in [section 1] and to the relevant policies that are developed according to provisions of [LC0275].

This bill also requires that the department of commerce design a labelling sticker describing the energy efficiency measures in

newly constructed homes. In designing this energy labelling sticker, the department of commerce should consult with the department of natural resources and conservation and with interested building industry and consumer groups.

It is the intent of the legislature that the department of commerce adhere to the recommendations related to energy efficiency in residential buildings developed under the auspices of HJR 31, adopted by the 1991 legislature.

In accordance with the recommendations resulting from the directive of HJR 31 of the 1991 legislative session, the legislature intends that rules pertaining to energy conservation in residential buildings may not apply to those buildings containing less than five dwelling units and not otherwise subject to the state building code unless an energy efficient affordable housing program is established as provided by [HB 10]. The coordination instruction in [section 7 of this act] reflects this intent.

It is further the intent of the legislature that in applying the energy conservation provisions of the state building code to all residential buildings as provided in [section 2] of [this act], the enforcement of those provisions be accomplished through builder self-certification as provided in [section 4] and not through enforcement by the department of commerce, except for those residential structures containing five or more dwelling units or for those residential structures otherwise subject to the state building code.

NEW SECTION. **Section 1. Statement of policy on residential**

energy efficiency. The legislature finds that the people of Montana have an interest in energy efficiency in residential buildings for the purpose of protecting and improving their economic and environmental well-being and energy security, while recognizing the basic need for safe and affordable shelter. It is therefore the policy of the state of Montana to encourage energy efficiency in residential buildings through strategies that ensure that:

(1) the housing consumer has access to the information required to make informed choices about structures and energy efficiency measures;

(2) energy efficiency measures are safe, reliable, and readily available for use in Montana;

(3) investments in energy efficiency measures are cost effective;

(4) the cost of energy efficiency measures on the combination of downpayments, monthly mortgage payments, and monthly utility bills does not adversely affect the affordability of housing to prospective homebuyers and renters; and

(5) energy efficiency measures do not place an undue or inequitable burden on residential building owners or renters, the residential construction industry, financial institutions, real estate sales persons and appraisers, energy providers, or state and local governments.

Section 2. Section 50-60-102, MCA, is amended to read:

"50-60-102. Applicability. (1) ~~The~~ Except as otherwise provided, state building codes do not apply to:

(a) residential buildings containing less than five dwelling units or their attached-to structures, any farm or ranch building, and any private garage or private storage structure used only for the owner's own use, located within the municipality's or county's jurisdictional area, unless the local legislative body or board of county commissioners by ordinance or resolution makes the state building code applicable to these structures; or

(b) mines and buildings on mine property regulated under Title 82, chapter 4, and subject to inspection under the Federal Mine Safety and Health Act.

(2) ~~The~~ Except as otherwise provided, the state may not enforce the state building code under 50-60-205 for the buildings referred to in subsection (1). Local governments that have made the state building codes applicable to the aforementioned buildings may enforce within their jurisdictional areas the state building code as adopted by the respective local government.

(3) Where good and sufficient cause exists, a written request for limitation of the state building code may be filed with the department for filing as a permanent record.

(4) The department may limit the application of any rule or portion of the state building code to include or exclude:

(a) specified classes or types of buildings according to use or other distinctions as may make differentiation or separate classification or regulation necessary, proper, or desirable;

(b) specified areas of the state based upon size, population density, special conditions prevailing therein, or other factors which make differentiation or separate classification or regulation

necessary, proper, or desirable.

(5)(a) For purposes of promoting the energy efficiency of home design and operation, the provisions of the state building code relating to energy conservation adopted pursuant to 50-60-203(1) apply to all residential buildings, except for:

(i) farm and ranch buildings; and

(ii) any private garage or private storage structure attached to the residential buildings and used only for the owner's own use.

(b) The provisions of the state building code relating to energy conservation in residential buildings are enforceable:

(i) by the department only for those residential buildings containing five or more dwelling units or otherwise subject to the state building code; and

(ii) through the builder self-certification program provided for in [section 4] for those residential buildings containing less than five dwelling units and not otherwise subject to the state building code."

{Internal References to 50-60-102: None.}

Section 3. Section 50-60-203, MCA, is amended to read:

"**50-60-203. Department to adopt state building code by rule.** (1)(a) The department shall adopt rules relating to the construction of, the installation of equipment in, and standards for materials to be used in all buildings or classes of buildings, including provisions dealing with safety, sanitation, and conservation of energy. The department may amend or repeal such rules.

(b) The department, in adopting rules concerning the conservation of energy, shall conform those rules to the policy established in [section 1] and to relevant policies developed under the provisions of [LC0275].

(2) The department may adopt by reference nationally recognized building codes in whole or in part, but this does not prevent the department from adopting rules more stringent than those contained in such codes.

(3) The rules, when adopted as provided in parts 1 through 4, constitute the "state building code" and are acceptable for the buildings to which they are applicable.

(4) The department shall adopt rules that permit the installation of below-grade liquefied petroleum gas-burning appliances in single-family dwellings."

{Internal References to 50-60-203:
x 50-60-101}

NEW SECTION. **Section 4. Enforcement of energy code through builder certification.** A person who begins construction on a residential building in Montana after [the effective date of this act], shall certify in writing to the building owner at the conclusion of construction that the residential building has been constructed in compliance with the energy efficient construction standards adopted under the provisions of 50-60-203(1).

NEW SECTION. **Section 5. Energy labelling sticker.** (1) The department, in consultation with the department of natural

resources and conservation, shall prescribe by rule requirements for a labelling sticker to be affixed to a new residential building that describes the energy efficiency components of the home, including but not limited to heating appliance efficiencies and ceiling, wall, floor, window, and door R or U values of new residential buildings.

(2) A person constructing a new residential building shall affix to that residential building in a manner prescribed by the department a labelling sticker as described in subsection (1).

NEW SECTION. **Section 6. {standard} Codification instruction.** [Sections 4 and 5] are intended to be codified as an integral part of Title 50, chapter 60, part 2, and the provisions of Title 50, chapter 60, part 2, apply to [sections 3 and 4].

NEW SECTION. **Section 7. Coordination instruction.** If an appropriation is not provided to the department of natural resources and conservation to establish a housing loan reserve account for energy efficient homes as provided in House Bill No. 10, then [sections 2 and 4 of this act] are void.

-END-

{Deborah B. Schmidt
Drafter, 444-3742}

APPENDIX C

HJR 31
ENERGY POLICY STUDY DESIGN WORKING GROUP

Senator Steve Doherty, Working Group Chairman/Environmental Quality Council (EQC)

Senator David Rye, EQC

John Fitzpatrick, EQC

Art Wittich, Governor's Office/EQC

Van Jamison, Department of Natural Resources and Conservation

Rep. Joe Quilici (Bob Nelson), Legislative Consumer Committee

Bob Anderson (Dan Elliott), Public Service Commission

Shirley Ball, Ethanol/Agriculture

Jay Downen (Jim Eskridge), Rural Electric Cooperatives

Dave Houser, Electric/Natural Gas Utilities

Ben Havdahl, Montana Motor Carriers Association

John Hines, Northwest Power Planning Council

Tom Marvin, Montana Local Government Energy Office

Jim Morton, District XI Human Resource Council

Gerald Mueller, Regulation/Least Cost Planning Group Coordinator

Jim Nybo, Conservation/Environmental Organizations

Dennis Pierce (Bill Kelldorf), Shell Western Exploration and Production, Inc.

Dave Simpson (Darrel Myran), Westmoreland Resources

Sandy Straehl, Montana Department of Transportation

APPENDIX D

EQC ENERGY POLICY ANALYSIS METHODOLOGY WORKING GROUP MEMBERS

Doug Abelin, Northern Montana Oil & Gas Association

Jerome Anderson, Attorney for Shell Western E.& P., Inc.

Shirley Ball, Ethanol Producers and Consumers

Richard Brown, MECA and Ravalli County Electric-Coop

Frank Buckley, Montana Consumer Counsel

Janelle Fallan, Montana Petroleum Counsel

H. S. Hanson, Energy Conservation Consultants

Dave Houser, Montana Power Company

Van Jamison, Montana Department of Natural Resources and Conservation, Energy Division

Gail Kuntz, Bonneville Power Administration

Gerald Mueller, Regulation/Least Cost Planning Group Coordinator

Jim Nybo, Conservation/Environmental Organizations

Gene Phillips, Pacific Power and Light

J. Monte Sealey, Musselshell Valley Development Corporation

Dave Simpson, Westmoreland Resources/Montana Consumer Counsel

Mike Volesky, Montana Associated Utilities

Art Wittich, Governor's Office/EQC

APPENDIX E

ENERGY POLICY ANALYSIS METHODOLOGY

INTRODUCTION

A. Background:

House Joint Resolution 31 (1991) directed the Environmental Quality Council to develop a framework for a proposed state energy policy. The EQC Energy Policy Analysis Methodology is an element of the framework that was developed by a working group appointed by the EQC and staffed by the Department of Natural Resources and Conservation. The methodology is designed as a tool for evaluating the costs and benefits of energy-related legislation that will result in state energy policies.

B. Purpose:

The purpose of the EQC Energy Policy Analysis Methodology is to inform legislators and others regarding the implications of energy-related legislation. The methodology is to be used 1) to frame debates or focus discussions on proposed and prospective energy legislation facing the state, and 2) to evaluate legislative proposals through an on-going energy policy development process.

The methodology itself is not intended to dictate any predetermined conclusions or to make energy policy decisions for legislators. It is designed to serve a role similar to that of a fiscal note and can be prepared by a variety of people, including agency and legislative staff, lobbyists, and other individuals or groups who are also involved in the preparation of fiscal notes. Different individuals and organizations may come to different conclusions using the methodology. The methodology is not intended for administrative rule making.

C. Focus:

Decisions on energy and how they are implemented affect numerous aspects of society. The identification of potential costs and benefits of energy proposals should include adequate consideration of all related aspects, including potential economic, social, environmental, and fiscal effects. The Energy Policy Analysis Methodology is designed to identify and describe each of the potential effects of energy-related legislation, and the distribution of those effects, in a consistent format.

Types of legislative proposals that are evaluated using this methodology may include tax measures to encourage production or development of various energy sources and technologies, funding allocations for state energy programs, energy conservation incentives, and other mechanisms to influence how energy is produced and consumed in the state.

D. Framework:

The methodology consists of two parts, an Energy Policy Evaluation Worksheet, and an Effects Summary Table. The purpose of the worksheet is to describe all of the potential effects of a given legislative proposal in detail. The Summary Table is used to summarize the effects of a given proposal in concise, comprehensive terms. Legislators can then review the table as a reference in their decision making process.

1. Energy Policy Evaluation Worksheet --

The first part of the Energy Policy Evaluation Worksheet requests a description of the legislative proposal being evaluated. Agency staff, legislative staff, and others filling out the worksheet are asked to identify the problems or issues the legislative proposal is attempting to address, to describe the proposal in detail, and to include an explanation of the intent of the proposed legislation.

The second part of the worksheet consists of the guidelines for the evaluation of the given legislative proposal. This section is used to evaluate effects on energy, the environment, and the economy along with fiscal effects, social effects, and the distribution of the potential effects among different income groups, sectors of the economy, and geographic areas.

2. Effects Summary Table --

The Effects Summary Table summarizes the potential effects of proposed energy legislation. The table is divided into the same categories as the Policy Evaluation Worksheet. Within each category is a numbered list of the various effects and a space next to each for brief descriptions. Information from each answer on the worksheet is summarized in the appropriate sections of the Summary Table. The purpose of the table is to allow potential effects to be quickly and thoroughly reviewed by legislators and other interested parties.

II. PROPOSAL DESCRIPTION

This section focuses on a description of the proposed or prospective legislation being evaluated. Answer the following questions as completely as possible. If additional space is needed, supplementary pages may be used.

1. **Describe the proposed legislation.**

2. **Explain the intent of the proposed legislation.**

3. **Identify and describe the energy problems or issues that the legislative proposal is attempting to address.**

III. PROPOSAL EVALUATION

INSTRUCTIONS

The following section is to be used by agency staff, legislative staff, and others for developing and evaluating information on the potential effects of proposed and prospective energy legislation. The section is divided into six categories: energy effects, environmental effects, economic effects, fiscal effects, social effects, and distribution of effects. Each category comprises a series of questions designed to provide legislators and others with detailed information on all of the potential effects of the proposed legislation.

General Directions:

Answer the questions in each of the following categories as completely and in as much detail as possible. Be sure to list any assumptions used in reaching the answers. Descriptions of the costs and benefits in each category should include quantitative and/or qualitative measures of the potential effects, with specific attention given to detailed descriptions of the effects and an identification of who benefits and who pays in the particular situation. If certain findings require more space than is available on the worksheet, additional pages may be used. If more than one proposal is being evaluated, separate worksheets should be prepared for each.

Certain questions included in the worksheet may not be relevant for evaluation of all proposals. For example, some questions may be applicable only when the proposed legislation involves the evaluation of a project such as a tax credit encouraging the construction of an energy production facility. Unless otherwise indicated in the question, it is up to those filling out the worksheet to identify which items may or may not be relevant for the given proposal. Those filling out the worksheet for a specific legislative proposal *need only complete the items relevant to that proposal* and should indicate which items are not by writing "Not Applicable" or "N.A." in the space provided.

Several questions require that the short-term and long-term effects of the proposed legislation be identified. The inclusion of this time element in the methodology is necessary in order to help identify the durability of the potential effects of proposed legislation. The short-term should identify immediate effects, and

the long-term should identify more enduring effects. The definition of short-term and long-term can vary. Where questions ask for identification of short-term and long-term effects, describe in your answer the assumptions made to define this time element. Example: short-term = 1 to 3 years; long-term = over 3 years.

Suggestions:

Two types of measures may be used in answering the questions on the worksheet. Responses may include qualitative measures, quantitative measures, or both, depending on the nature of the question and on available information.

Quantitative Measures --

Whenever possible, potential effects should be quantified, using appropriate analytic techniques. Quantification of effects provides information that is reproducible and that may be easily compared with results from the analysis of alternative proposals.

A number of effects in each category may be identified in quantitative terms, either with estimated ranges or in specific figures. This may include measures such as number of jobs created or lost; amount of energy produced or saved (in Btu, MW, Kwh, and other units); gallons or acre feet of water used or saved; micrograms per cubic meter of pollutants increased or reduced; and so on. Other measures may be monetary, including dollar costs of a project or program; changes in the price of energy products; changes in income, etc. It is also possible to measure certain externalities, such as environmental effects, in monetary terms. Generally, cost-benefit analysis is used to identify and evaluate the monetary effects of a given proposal. It may be necessary and appropriate, if time and resources allow, for a cost-benefit analysis to be completed for the proposal being evaluated. Pages 64 and 65 briefly describe the techniques behind cost-benefit analysis and present a simple numeric example.

When using quantitative measures, be sure to list and describe any assumptions used in answering the questions.

Qualitative Measures --

Qualitative analysis relies on detailed descriptions of potential effects rather than on monetary or other figures.

Not all costs and benefits are easily quantified. In certain cases, time constraints or lack of resources or information may limit the ability to measure certain effects. For example, suppose that proposed legislation is promoting research on coal conversion technologies that are expected to greatly improve efficiency. Precise figures on potential energy savings may not be available at the time the proposal is being reviewed. A description of the potential effects, without identifying specific values, may be all that time and resources allow. If legislators desire more detailed information, a cost-benefit analysis or a technical study may be needed before a decision can be made on the proposal.

Many potential effects cannot be described in quantitative terms. This does not mean, however, that the effects are not important for consideration in the analysis of a legislative proposal. For example, the magnitude of effects on lifestyles and cultures, environmental effects such as impacts on wildlife, and many other potential effects may not be readily quantified, but their existence may have important implications for the acceptability of the proposal.

Use of qualitative analysis enhances available information by identifying or "flagging" environmental or other potential effects of proposed energy legislation. It can therefore be an important part of the decision making process. When describing potential effects in qualitative terms, be sure to identify that qualitative assessments have been made and describe any assumptions used in answering the questions.

EVALUATION CATEGORIES

A. ENERGY EFFECTS

1. If the proposed legislation addresses a specific project, identify and describe the total dollar costs for the project, including costs of capital, production and operating costs, maintenance costs, etc. Please include the present value of future streams of costs, when possible (see Appendix).

2. Identify and describe the amount of energy (in Btu, MW, Kwh, or other units) expected to be produced or saved as a result of the proposed legislation.

3. Describe the expected time frame in which the potential energy production or savings will be realized. (Include estimated starting date for energy production or savings and estimated duration of future streams of production or savings.)

4. **Identify and describe the potential risks and uncertainties. Specify who may be exposed to the potential risks, and include, when possible, the potential monetary impact of the risks.**

5. **Identify and describe the effects of the proposed legislation on energy reliability (peak load capabilities).**

6. **Identify and describe the potential impacts of the proposed legislation on state and national energy security.**

7. **Identify and describe any benefits the proposed legislation may have from an energy research, development, and demonstration perspective.**

B. ENVIRONMENTAL EFFECTS

1. **Identify and describe the potential effects of the proposed legislation on air quality.**

2. **Identify and describe the potential effects of the proposed legislation on water quality and quantity, both surface and underground.**

3. Identify and describe how the proposed legislation may affect existing water rights. Include, if necessary, a description of the amount of water (in acre feet or other units) needed in the given proposal and an identification of potential changes in direct and indirect water use.

4. Identify and describe the potential effects of the proposed legislation on wildlife populations and habitats.

5. Identify and describe the potential effects of the proposed legislation on land use.

6. Identify and describe any other potential environmental effects of the proposed legislation, such as impacts on noise pollution, public health and safety, etc.

7. Identify and describe how the proposed legislation may affect the possible alternative uses for natural resources in the short-term and the long-term. Include a description of resources used and identify the potential alternative uses for those resources.

C. ECONOMIC EFFECTS

1. Identify and describe how the proposed legislation may affect local, state, and regional jobs in the short-term and long-term. Specify the number of jobs that may be created or lost as a result of the proposal and the sector or industry where each change will occur.

2. **Identify and describe how the proposed legislation may affect local, state, and regional income in the short-term and long-term. Specify which groups may experience increases in income as a result of the proposal and which groups may experience decreases.**

3. **Identify and describe the potential effects of the proposed legislation on energy prices.**

4. **Identify and describe how changes in the price of the energy product may affect the competitiveness of the energy producer.**

5. Identify and describe how changes in the price of the energy product may affect the competitiveness of non-residential energy users. Specify which users might be affected.

6. Identify and describe how the proposed legislation may affect the affordability of energy to consumers. If possible, specify which income groups might be affected.

D. FISCAL EFFECTS

1. Identify and describe the short-term and long-term revenue and expenditure implications of the proposed legislation to state and local government.

2. Identify and describe the short-term and long-term implications and the associated costs of the proposed legislation to state and local government services. This may include effects on operating expenses, capital outlay, local assistance/grants, benefits and claims, etc.

3. Identify and describe any potential barriers to the implementation of the proposed legislation, including provisions in existing laws, regulations, or programs.

4. Identify and describe any additional federal, state, and local tax incentives or subsidies that may be needed to implement the proposed legislation. Include, if possible, an indication of how sensitive the proposal might be to changes in future and existing incentives and subsidies.

E. SOCIAL EFFECTS

1. **Identify and describe the potential impact of the proposed legislation on human populations, lifestyles and cultures.**

F. DISTRIBUTION OF EFFECTS

1. **Identify and describe in detail different income groups, sectors of the economy, and geographic areas that would be affected by the proposed legislation.**

COST-BENEFIT ANALYSIS

Some costs and benefits, both direct and indirect, can be measured in monetary terms. The monetary measurement of costs and benefits is one way to evaluate and compare proposals. This section briefly explains the techniques used for a simple cost-benefit analysis. Included is a simple numeric example which illustrates the calculation of results. A more detailed cost-benefit analysis may be needed for a some proposals.

Cost-benefit analysis allows for the potential monetary costs and benefits over different time horizons to be identified. This time element is important for several reasons. A proposed project or program may not generate benefits for several years, although its costs may be realized almost immediately. A benefit received 5 years from now has a lower economic value than a benefit received this year. Similarly, an expenditure incurred this year has a higher economic cost than the same expenditure incurred 5 years from now, because resources involved could be used in the meantime for other purposes. A "discount rate" is used to account for costs and benefits of a project over time.

The basic formula for calculation of the present value of a future stream of costs or revenues is the following:

The present value of $R_t = R_t (1 + i)^{-t}$.

The present value of $C_t = C_t (1 + i)^{-t}$.

Where t = year in which the cost or revenue is realized (starting with 0 for initial outlay).
R_t = the revenue figure for year t.
C_t = the cost figure for year t.
i = the discount rate of interest.

The total net present value (NPV) of a given proposal is found by summing the present values of costs and revenues over each year in the life of the project or program and subtracting the total present worth of the costs from that of the revenues.

$$NPV = \Sigma_t R_t (1 + i)^{-t} - \Sigma_t C_t (1 + i)^{-t}$$

for each year t in the life of the project or program.

The value of the discount rate used in the analysis can vary. Generally, a higher discount rate lowers the present worth of a future stream of costs and benefits. If the rate of discount is 10 percent, for example, the present value of a

cost of $100 which will not be incurred until next year or a benefit of $100 which will not be received until next year is $\$100(1 + 0.1)^{-1} = \$100/(1.1) = \$90.91$. Similarly, a cost or revenue of $100 two years from now would have a present value of $\$100(1.1)^{-2} = \$100/(1.21) = \$82.64$. If a discount rate of 4 percent were used, the present value of $100 one year from now would be $\$100/(1.04) = \$96.15$. Lower discount rates are often used if there are potential social costs or benefits which may be missed by the monetary measurement of the benefit and cost streams. More projects or programs may appear viable given a lower discount rate. The higher discount rate is used primarily to assess a proposal on more stringent terms.

Example of a simple cost-benefit analysis:

(in thousands of dollars)

	Costs			*Benefits*			*Present Worth (10%)*	
Year	(1)	(2)	Total	(1)	(2)	Total	*Costs*	*Benefits*
0	50	0	50	0	0	0	50	0
1	75	0	75	0	0	0	68.18	0
2	0	10	10	45	15	60	8.26	49.58
3	0	10	10	40	10	50	7.51	37.56
4	0	10	10	34	6	40	6.83	27.32
5	0	10	10	30	2	32	6.20	19.86
6	0	10	10	25	1	26	5.64	14.68
7	0	10	10	20	0	20	5.13	10.27
Total							**157.75**	**159.27**

Net Present Worth = $1.52 thousand dollars (the difference between the Total Present Worth of Benefits and Costs).

NOTE: These figures were arbitrarily chosen for illustrative purposes.

Results of cost-benefit analysis for the proposed legislation (use additional pages if necessary):

EFFECTS SUMMARY TABLE

DIRECTIONS: Using the information in the Policy Evaluation Worksheet, summarize the potential effects of the proposed legislation as completely as possible in the space provided.

DESCRIPTION OF THE PROPOSAL:	
COSTS AND BENEFITS	SUMMARY OF EFFECTS
A. ENERGY EFFECTS	
1. Potential Energy Production Potential Energy Savings	
2. Time Period of Expected Production or Savings	
3. Risks and Uncertainties	
4. Impacts on Energy Reliability	
5. Impacts on Energy Security	
6. Energy Research and Development Benefits	
7. Total Project Dollar Costs	
B. ENVIRONMENTAL EFFECTS	
1. Effects on Air Quality	
2. Effects on Water Quality Effects on Water Quantity	

COSTS AND BENEFITS	SUMMARY OF EFFECTS
B. ENVIRONMENTAL EFFECTS (Continued)	
3. Effects on Existing Water Rights	
4. Effects on Wildlife Populations and Habitats	
5. Effects on Land Use	
6. Other Environmental Effects (Specify):	
7. Effects on Alternative Resource Uses	
C. ECONOMIC EFFECTS	
1. Impacts on Local, State, and Regional Jobs Specific Sectors Affected	
2. Effects on Local, State, and Regional Income Specific Income Groups Affected	
3. Impacts on Energy Prices	
4. Impacts on Competitiveness of Energy Producers	
5. Impacts on Competitiveness of Non-Residential Users Specific Users Affected	
6. Effect on Affordability of Energy to Consumers	

EFFECTS SUMMARY TABLE

COSTS AND BENEFITS	SUMMARY OF EFFECTS
D. FISCAL EFFECTS	
1. Change in Local and State Tax Revenue Change in Local and State Expenditures	
2. Impacts on Government Services Timing of Effects	
3. Barriers to Implementation	
4. Additional Federal, State, Local Tax Incentives/Subsidies Needed	
E. SOCIAL EFFECTS	
Effects on Population, Lifestyles and Cultures	
F. DISTRIBUTION OF EFFECTS	
Who Benefits (Specify):	
Who Pays (Specify):	
ADDITIONAL NOTES OR COMMENTS:	

APPENDIX F

EQC RESIDENTIAL ENERGY EFFICIENCY WORKING GROUP PARTICIPANTS

Duane A. Anderson, Montana-Dakota Utilities Co.

Duane Broadbent, Central MT Electric Power Co-op

Don Chance, MT Building Industry Association

Alan Davis, Montana Department of Natural Resources and Conservation (DNRC)

Dan Elliott, Montana Public Service Commission (PSC)

Mike Fasbender, Lumber Yard Supply

John Graham, Pacific Power and Light

H.S. "Sonny" Hanson, Energy Conservation Consultants

John Hines, Northwest Power Planning Council

Sharon Jacobson, Missoula Electric Co-op

Jim Kembel, Montana Department of Commerce, Public Safety Division

Gail Kuntz, Bonneville Power Administration

Steve Loken, Southwall Builders/AERO

Gary Mahugh, Flathead Electric Co-op.

Janeth Martin, Co-Chair Montana Banking Association Real Estate Committee

Tom Marvin, Montana Local Government Energy Office

Mack McConnell, Montana Electric Co-op Association

Lou Moore, DNRC

James Morton, District XI Human Resource Council

Diane Noennig, Western Area Power Administration

Denise Peterson, PSC

C. Eugene Phillips, Pacific Power and Light

John Ralph, Montana Power Company

Shiela Rice, Great Falls Gas Company

Sam Toole, Montana Environmental Information Center

APPENDIX G

MONTANA ENERGY LAW SURVEY

INTRODUCTION

The Project

The Montana Energy Law Survey (the "Survey") was prepared for the Montana Environmental Quality Council by the law firm of Murphy, Robinson, Heckathorn & Phillips, P.C. of Kalispell, Montana. The project was funded in part by a grant from the Northwest Power Planning Council and was designed chiefly to assist the Environmental Quality Council in carrying out its mandate of formulating recommendations to the Montana Legislature to assist the Legislature in its task of forging energy policy for Montana's future.

The process of converting Montana's bountiful natural resources into energy is influenced by a multitude of constitutional provisions, statutes, and administrative regulations. Some have a profound and direct influence on energy production, while the impact of others is less immediate. The Montana Energy Law Survey is a compendium of those provisions of the Montana Constitution, statutes, and administrative rules which most directly impact the process of converting the state's resources into energy. Some degree of editorial license has been exercised in determining just where the line was to be drawn between those provisions of Montana law which directly influence energy production (and are thus included in the Survey) and those the impacts of which are tangential (and are thus not included). In exercising that editorial license, particular consideration was given to two other related projects; viz: the Environmental Quality Council's Montana Index of Environmental Permits (8th Ed. 1991) and the Montana Environmental Law Handbook prepared by the Billings law firm of Crowley, Haughey, Hanson, Toole & Dietrich. Because of the existence of these two comprehensive works on Montana's environmental laws and regulations, the Montana Energy Law Survey, with certain exceptions (most notably the Major Facility Siting Act), does not include extensive consideration of Montana's major environmental acts and their implementing rules and regulations. Nonetheless, it must be borne in mind in considering Montana's energy-related law that a significant role is played by environmental legislation. The most significant of these environmental enactments is the Montana Environmental Protection Act, discussed in the paragraphs which follow.

Environmental Considerations - MEPA

The Montana Environmental Policy Act, Section 75-1-101, et seq., Montana Code Annotated (MCA), commonly referred to as MEPA, is a legislative mandate that

each state agency consider the environmental implications of its actions, and in any case in which the actions of the agency may have an impact on the human environment, the agency must undertake some form of environmental review. In conducting that environmental review, the agencies are required to employ an interdisciplinary approach designed to insure the coordinated use of the natural and social sciences and the environmental design arts. Depending on the potential environmental impacts of the proposed action, the involved agency must prepare either an environmental assessment (EA) or a more comprehensive environmental impact statement (EIS).

MEPA's requirements have important consequences for energy development as they apply not only to actions initiated by an agency of state government, but also to any private sector energy project which requires a permit from the state and has the potential to impact the environment. Accordingly, consideration of MEPA must be given with regard to any energy related project in Montana which requires action by the state. To implement MEPA's mandate, those agencies which have substantial regulatory authority with respect to energy and environmental matters have adopted a largely uniform set of model rules for MEPA's implementation and to assure its interdisciplinary application.[1]

Organization of the Survey

The Montana Energy Law Survey is for the most part organized by resource (e.g., coal, oil and gas, etc.), with, in addition, chapters addressed specifically to electric energy, conservation, and Public Service Commission regulation. The resources are broadly grouped as follows: Chapter 1 -- "Non-Renewable Resources" comprised of coal, oil and gas, and uranium; and Chapter 2 -- "Renewable Resources" which include hydroelectric, solar, wind, geothermal, biomass, and cogeneration.

The decision to devote a separate chapter to electric energy was influenced by the notion that energy production from many, if not all, of Montana's natural resources may at some point take the form of electric energy. In many instances, depending upon that phase in the energy production process at which a resource is converted to electric energy, resource distinctions, whether from a technical or legal point of view, are no longer significant. Thus, the subject of electric energy was given separate treatment in its own chapter.

---

[1] Model Rules for Mepa's implementation have been adopted by the following agencies: Department of Agriculture: ARM 4.2.312, et seq.; Department of Fish, Wildlife and Parks: ARM 12.2.428, et seq.; Department of Health and Environmental Sciences: ARM 16.2.601, et seq.; Department of Transportation: ARM 18.2.235, et seq.; Department of State Lands: ARM 26.2.628, et seq.; Department of Natural Resources and Conservation: ARM 36.2.521, et seq.

Energy conservation receives its own individual treatment in Chapter 4. The growing significance of conservation as an alternative to the conversion of more and more scarce natural resources into energy seemed to warrant a special chapter for the topic. Finally, the role of the Public Service Commission and its regulatory function as it pertains to energy-producing utilities doing business in this state dictated that at least an overview of the Commission's role in energy production should be included. Thus, it too was given separate treatment in its own chapter; the final chapter of the Survey, Chapter 5.

Using the Survey

Citations to statutes and rules in the Survey are in most instances to the first statute or rule in a series of related provisions. In the case of statutes, generally the citation is to the first statute of a chapter part. In some instances, however, the citation may be to an entire chapter without separation into its parts, or to a specific section. In the case of rules, generally the citation is to the first rule of the relevant sub-chapter. Appropriately, the Latin phrase "et sequitur" (et seq.) or "and following" would appear after each citation. However, for simplicity, the "et seq." reference has been deleted.

The descriptions of the statutory or regulatory provisions are distillations of what in many instances are lengthy and complex legislative enactments and regulatory schemes. The aim of that process of distillation was to highlight the features of the relevant provisions with a particular eye toward their impact on the subject of energy production. In order to assure comprehensive understanding of the statutory or regulatory scheme involved, the Survey is no substitute for resort to the provisions themselves, and consideration of the full text of the provisions should in each case be undertaken before relying on the Survey. As is the case with the Environmental Quality Council's Index of Environmental Permits: "This document summarizes portions of Montana law that deal with the use and development of the State's natural resources. It is not, however, a legal document and should not be relied on exclusively to determine legal responsibilities." Montana's Index of Environmental Permits (8th Ed. 1991), at page vii.

Murphy, Robinson, Heckathorn & Phillips
Donald R. Murray
Kendra L. Kawaguchi
C. Eugene Phillips

CHAPTER 1 - NONRENEWABLE RESOURCES

Part 1
COAL

1.1.1 EXPLORATION

Montana Code Annotated (MCA)

77-3-301 Authorizes the Board of Land Commissioners to lease state lands for the purposes of coal exploration and mining; imposes certain limitations and requirements on coal mining leases and provides for the disposition of royalties and other revenues.

Administrative Rules of Montana (ARM)

26.2.201 General rules for leasing for mineral exploration and development, and for licensing and permitting for other uses of state lands.

26.2.401 Fee schedule for applications for and leases and easements on state lands.

26.3.301 Rules governing issuance of coal leases on state lands.

1.1.2 PRODUCTION, DEVELOPMENT AND ENVIRONMENTAL REGULATION

Constitutional Provisions

Article IX, Section 2

Constitutional provision which requires that all lands which are disturbed by the taking of natural resources be reclaimed. Requires the legislature to provide effective requirements and standards for reclamation of these disturbed lands. Also mandates that the legislature establish the resource indemnity trust, which is to be funded by taxes imposed on the extraction of natural resources. The principal of the resource indemnity trust is required, under this section, to remain inviolate in the amount of one hundred million dollars.

Montana Code Annotated (MCA)

7-8-2233	Provisions regulating coal leasing by local governments on lands owned or acquired by political subdivisions. Restricts the duration of leases to a period of 10 years, or so long as coal is being mined in commercial quantities.
50-73-101	The "Montana Coal Mining Code"; imposes certain duties regarding safety requirements to be administered by the Department of Labor and Industry. The Department of Labor and Industry is authorized to adopt rules necessary to carry out the provisions of this chapter and to ensure compliance with safety standards for coal mines located within the State of Montana. Imposes requirements on mine operators pertaining to maps, surveys and boundary lines, and provides for inspections of facilities.
75-2-101	The "Clean Air Act of Montana"; a permitting process administered primarily by the Department of Health and Environmental Sciences to assure compliance with the ambient air and emission standards which may apply to fossil-fuel burning energy facilities.
75-5-101	The "Montana Water Quality Act"; implements a policy of conserving water resources and protecting water quality; establishes a permitting process administered by the Department of Health and Environmental Sciences for discharge of mining and industrial waste water; provides for enforcement, appeals and penalties for violations of standards.
75-20-101	The "Montana Major Facility Siting Act"; the policy and purpose of which is to assure a clean and healthful environment and to prevent the unreasonable depletion and degradation of the state's natural resources, implements a certification process, administered primarily by the Departments of Natural Resources and Conservation and Health and Environmental Sciences, for any new construction or modification of an energy conversion facility. "Facilities," with certain exceptions, are defined as any plant, unit or other facility having certain specified minimum capabilities. (In the case of coal, facilities generating in excess of 50 megawatts of electricity or utilizing or converting in excess of 500,000 tons of coal per year, or

having an estimated cost in excess of $10 million, are subject to the provisions of the Act. There is a specific exemption for facilities subject to the Montana Strip and Underground Mine Reclamation Act in 75-20-104(10)(a).)

77-3-301 Authorizes the Board of Land Commissioners to lease state lands for the purposes of coal exploration and mining; imposes certain limitations and requirements on coal mining leases and provides for the disposition of royalties and other receipts.

82-4-101 The "Strip and Underground Mine Siting Act"; authorizes the Department of State Lands to review and regulate new strip-mine and underground-mine site location and reclamation plans. Imposes permit requirements for strip and underground mines, and provides for the termination and suspension of permits for noncompliance with this part.

82-4-201 The "Montana Strip and Underground Mine Reclamation Act"; creates a permitting process for strip and underground coal mining administered by the Department of State Lands; permit applications must contain comprehensive reclamation plans for all affected lands; investigative and enforcement powers are given to the Department.

90-6-201 Establishes a special fund ("local impact account") to provide grants and loans to assist local governments in dealing with the impacts of large-scale development of coal mines and coal burning energy facilities.

Administrative Rules of Montana (ARM)

8.101.101 Implements the policy of Section 90-6-201, et seq., MCA, establishing a coal board to assist local governments deal with impacts from the development of large-scale coal mining and coal burning energy facilities.

12.5.101 Sets forth Montana Fish & Game Commission statement of policy relative to coal mining.

16.2.501 Department of Health and Environmental Sciences rules for administering the "Major Facility Siting Act."

16.8.101 Rules and regulations implementing the "Clean Air Act of Montana."

16.20.601	Rules and regulations implementing surface and water quality statutes ("Montana Water Quality Act").
26.2.201	General rules for leasing for mineral exploration and development and for licensing and permitting for other uses of state lands.
26.2.401	Fee schedule for applications for and leases and easements on state lands.
26.2.501	Rent and royalty charges for oil and gas, coal and uranium leases on state lands.
26.3.301	Rules governing issuance of coal leases on state lands.
26.4.301	Rules implementing the "Montana Strip and Underground Mine Reclamation Act."
26.4.1801	Rules implementing the "Strip and Underground Mine Siting Act."
36.7.301	DNRC rules for administering the "Major Facility Siting Act."

1.1.3 TAXATION AND FISCAL PROGRAMS

Constitutional Provisions

Article IX, Section 2

See Section 1.1.2, supra.

Article IX, Section 5

Constitutional provision providing for the creation of the coal severance tax trust fund; requires the legislature to dedicate not less than one-fourth of the coal severance tax to the trust, from which interest and income may be appropriated. This provision also requires that the trust principal remain intact unless appropriated by three-fourths of the members of each house of the legislature. One half (50%) of the severance tax has been dedicated to the coal severance tax trust fund since December 31, 1979.

Montana Code Annotated (MCA)

5-18-201	Establishes the coal tax oversight subcommittee of the revenue oversight committee, which may: (1) review programs financed by coal severance tax funds; and, (2) consider any matters relating to coal taxation; and must, under this section: (1) report and make recommendations to the revenue oversight committee; and (2) prepare a report to the legislature on potential uses of the coal tax trust fund.
15-6-208	Provides an exemption from property taxation of one-half the contract sales price of coal sold by a coal producer who extracts less than 50,000 tons of coal per year.
15-23-701	The coal gross proceeds tax; provides for a system of reporting by producers and allocation of the tax by the Department of Revenue to local governments; directs county assessors to tax coal gross proceeds at 5% of reported value.[2]
15-24-2301	Procedural requirements for obtaining a clean coal technology tax exemption; under this chapter, the buildings, facilities, and equipment installed under a clean coal technology project are eligible for a property tax exemption. Projects must qualify as clean coal technology projects to be eligible for the exemption, and are subject to certain notice and hearing requirements.
15-35-101	The coal mine severance tax; imposes a severance tax on coal mine operators which is computed on each quarter year's worth of production as shown on forms provided by the Department of Revenue. Contains the formula by which the tax is to be computed; rates are based on the heating quality of the coal and the amount of coal produced. Also provides incentives in the form of tax credits for new coal production.[3]
15-38-101	The "Montana Resource Indemnity Trust Act"; the purpose of which is to indemnify the citizens of Montana for the loss

[2] See Page 132 for the specific rates and details of the coal gross proceeds tax.

[3] See Page 133 for the specific rates and details of the coal mine severance tax.

of long term value resulting from the depletion of Montana's mineral resource base and for damage caused by mineral development. This section establishes a permanent resource indemnity trust, funded through revenues generated from a tax levied on mineral extraction. Proceeds from the trust are to be expended for the purpose of protecting and restoring the environment from damages resulting from mineral development, and supporting a variety of economic development programs to benefit Montana and its citizens. Contains provisions which specify the amount of tax to be paid on different types of mineral production.

17-6-301 — The "Montana In-State Investment Act of 1983"; expresses legislative policy and purposes of the permanent coal tax trust fund, which are to: (1) compensate future generations for the depletion of resources caused by coal development; and (2) to develop a strong economy for Montana. States that the Board of Investments shall endeavor to invest up to 25% of the fund in the Montana economy, with special emphasis on local enterprises. This section also sets forth authorized investments, limitations on investments, and preferences for investments of revenue from the coal tax trust fund.

30-14-701 — Sets forth prohibitions against certain fraudulent acts in connection with the finances of mining and oil companies, including (1) failure to spend at least 75% of the money raised from the sale of public securities on either the actual operation and development of the oil or mining property, or on the construction of treating plants or payments on state property; (2) failure to apply net earnings to either a reserve fund, the distribution of dividends, the liquidation of bona fide indebtedness, or reasonable development of the properties; or (3) operating holding companies so as to deprive stockholders of the parent company of their interest in its earnings.

90-2-101 — "Renewable Resource Development Loans, Grants and Bonds"; authorizes the use of revenues from taxation of nonrenewable energy sources for the purpose of investing in an account from which loans and grants may be made to encourage the development of programs utilizing renewable resources and as compensation for the depletion of non-renewable resources.

90-2-1101	"Reclamation and Development Grants Program Act"; authorizes the Department of Natural Resources and Conservation to fund projects which will indemnify the people of Montana against the effects of coal and other mineral development, and to repair and mitigate environmental damage resulting from the extraction of non-renewable resources.
90-4-901	Creates the "clean coal technology demonstration fund," which is funded by money which would otherwise be deposited in the coal severance tax fund, the principal received from the repayment of loans made from the fund, and from any other source determined by the legislature. Requires the DNRC to make clean coal technology demonstration loans for qualifying clean coal technology projects authorized by the legislature, and establishes eligibility requirements for obtaining loans.

Administrative Rules of Montana (ARM)

36.18.101	DNRC rules for administering the program of "Renewable Resource Development Loans, Grants and Bonds" established by Part 1 of Chapter 2 of Title 90.
36.19.101	Rules for administering the "Reclamation and Development Grants Program Act."
42.21.132	Provides that all machinery and equipment used in the mining process shall be classified as class 8 property for property tax purposes; and establishes a depreciation formula.
42.25.501	Rules implementing the gross proceeds tax on the production of coal.
42.25.1701	Rules implementing the credit against the coal severance tax for consumption and production of coal.
42.32.101	Rules implementing the "Montana Resource Indemnity Trust Act."

1.2.1 EXPLORATION

Montana Code Annotated (MCA)

77-3-401	Authorizes the Board of Land Commissioners to lease state lands for the purposes of oil and gas exploration and production; imposes certain limitations and requirements on oil and gas leases and generally empowers the Board with broad authority over oil and gas leasing and production on state lands.
82-1-101	Imposes registration, bonding, and filing requirements on entities engaging in seismic exploration in the state of Montana. Also requires the Board of Oil and Gas Conservation to adopt rules: (1) requiring adequate identification of seismic exploration crews operating within Montana; (2) designating areas where seismic activities will not be allowed; and (3) regulating the plugging and abandonment of seismic shot holes.

Administrative Rules of Montana (ARM)

12.5.401	Procedures for oil and gas exploration, leasing and production on lands under the control of the Department of Fish, Wildlife & Parks.
26.2.201	General rules for leasing for mineral exploration and development and for licensing and permitting for other uses of state lands.
26.2.401	Fee schedule for applications for, and leases and easements on state lands.
26.3.201	Rules governing issuance of oil and gas leases on state lands.
36.22.101[4]	Chapter 22 of Title 36, ARM, contains the Department

[4] DNRC rules governing the operation of the Board of Oil and Gas Conservation appear in Chapter 22, Title 36 of the Administrative Rules of Montana. Those rules have recently

of Natural Resources and Conservation rules which govern the organization and operation of the Board of Oil and Gas Conservation. Subchapters 1 and 2 contain the Board's organizational and procedural rules; Subchapter 3 sets forth some general and definitional provisions; Subchapter 5 pertains to seismic exploration; Subchapter 6 to drilling permits; Subchapter 7 to well spacing; Subchapter 10 to drilling; Subchapter 11 to safety; Subchapter 12 to production; Subchapter 13 to abandonment and plugging of wells and surface restoration; and Subchapter 16 contains rules for the implementation of the federal "Natural Gas Policy Act of 1978."

36.22.501 Rules for the regulation of seismic exploration activities by the Board of Oil and Gas Conservation.

36.22.601 Board of Oil and Gas Conservation rules for obtaining permits for test wells.

1.2.2 PRODUCTION, DEVELOPMENT AND ENVIRONMENTAL REGULATION

Constitutional Provisions

Article IX, Section 2

Constitutional provision requiring that all lands which are disturbed by the taking of natural resources be reclaimed. Requires the legislature to provide effective requirements and standards for reclamation of these disturbed lands. Also mandates that the legislature establish the resource indemnity trust, which is to be funded by taxes imposed on the extraction of natural resources. The principal of the resource indemnity trust is required, under this section, to remain inviolate in the amount of one hundred million dollars.

---

undergone substantial revision. The most recent rule revisions will be effective July 30, 1992. The rules for the Underground Injection Control program will become final the day after primacy of the UIC program is delegated to the state by the U.S. Environmental Protection Agency.

Montana Code Annotated (MCA)

30-14-801	Provisions of the "Montana Retail Motor Fuel Marketing Act" setting forth prohibitions against certain unfair trade practices.
75-2-101	The "Clean Air Act of Montana"; a permitting process administered primarily by the Department of Health and Environmental Sciences to assure compliance with both ambient air and emission standards which may apply to fossil-fuel burning energy facilities.
75-5-101	The "Montana Water Quality Act"; implements a policy of conserving water resources and protecting water quality; establishes a permitting process administered by the Department of Health and Environmental Sciences for discharge of mining, drilling, and industrial waste water; provides for enforcement, appeals and penalties for violations of standards.
75-11-301	Establishes a fund administered by the petroleum tank release compensation board for clean up of petroleum tank release sites.
75-20-101	The "Montana Major Facility Siting Act"; the policy and purpose of which is to assure for present and future generations a clean and healthful environment and to prevent the unreasonable depletion and degradation of the state's natural resources. Implements a certification process, administered primarily by the Departments of Natural Resources and Conservation and Health and Environmental Sciences, for any new construction or modification of an energy conversion facility. "Facilities," with certain exceptions, are defined as any plant, unit or other facility (including "associated facilities" which include pipelines and storage facilities) having certain specified minimum capabilities. (In the case of oil and gas, a special exception is made in 75-20-104(10)(a), MCA, for crude oil and natural gas refineries.)
77-3-401	Authorizes the Board of Land Commissioners to lease state lands for the purposes of oil and gas exploration, drilling and production; imposes certain operational requirements on oil and gas leases and provides for the disposition of royalties

and other revenues.

82-10-201	Authorizes the lease of local government-owned lands for oil and gas leasing and development, and authorizes local governments to enter into pooling agreements with others.
82-10-301	Provides that it is the policy of the state that the conservation of natural gas by means of underground storage, and the creation of reserves of stored natural gas are in the public interest; gives natural gas public utilities the power of eminent domain in order to develop underground reservoirs, and outlines a certification procedure administered by the Board of Oil and Gas Conservation.
82-10-401	Requires that notice be given to the surface owner before any oil or gas well can be plugged or abandoned; requires the Board of Oil and Gas Conservation to maintain a record of plugged and abandoned oil and gas wells in the state.
82-10-501	Establishes a procedure for the compensation by means of "surface damage disruption payments" to the surface owner of lands disturbed by oil and gas drilling operations; imposes liability on the part of the oil and gas developer or operator for damages to property; provides a procedure for the settlement of surface damage claims.
77-3-501	Authorizes the Board of Land Commissioners to enter into leases for the underground storage of natural gas on state lands; requires that bonds be posted by lessees; specifies a maximum lease term of twenty years and establishes a procedure for cancellation or termination of leases.
82-11-101	Provides for the regulation of oil and gas development by the Board of Oil and Gas Conservation; sets forth the powers and duties of the Board; establishes requirements for oil and gas operations; authorizes the Board of Oil and Gas Conservation to establish well spacing units and plans for unit operations. Directs the State of Montana to become a member of the Interstate Compact to Conserve Oil and Gas, and sets forth provisions of the Compact.
82-15-101	Provides for the regulation of dealers of petroleum products by the Department of Commerce; establishes license requirements and inspection procedures, and proscribes

certain acts, including price discrimination, in connection with the sale of petroleum products.

85-2-303 Water right permit requirements for conversion of nonproductive oil and gas wells.

Administrative Rules of Montana (ARM)

12.5.102 Sets forth Montana Fish & Game Commission statement of policy relative to natural resource development.

12.5.401 Procedures for oil and gas exploration, leasing and production on lands under the control of the Department of Fish, Wildlife & Parks.

16.2.501 Department of Health and Environmental Sciences rules for administering the "Major Facility Siting Act."

16.8.101 Rules and regulations implementing the "Clean Air Act of Montana."

16.20.601 Rules and regulations implementing surface and ground water quality statutes under the "Montana Water Quality Act."

26.2.201 General rules for leasing for mineral exploration and development and for licensing and permitting for other uses of state lands.

26.2.401 Fee schedule for applications for and leases and easements on state lands.

26.2.501 Rent and royalty charges for oil and gas, coal and uranium leases on state lands.

26.2.502 Minimum fees for pipeline and electric transmission line easements on state lands.

26.3.201 Rules governing issuance of oil and gas leases on state lands.

36.7.901 DNRC rules for administering the "Major Facility Siting Act."

36.22.101 General provisions establishing the Board of Oil and Gas Conservation and implementing its regulatory purposes.

36.22.601 Requirements for permits for oil and gas test or producing wells.

36.22.701 Regulation of well spacing in drilling units.

36.22.1001 Rules regulating method of drilling oil and gas wells and disposal of solid drilling waste; and imposing reporting requirements.

36.22.1201 Rules regulating production of oil and gas by the Board of Oil and Gas Conservation; reporting and producer certification requirements.

36.22.1301 Regulations for the abandonment and plugging of wells, and surface reclamation.

36.22.1601 Regulations implementing the Natural Gas Policy Act of 1978.

1.2.3 TAXATION AND FISCAL PROGRAMS

Constitutional Provisions

Article IX, Section 2

Constitutional provision which requires that all lands which are disturbed by the taking of natural resources be reclaimed. Requires the legislature to provide effective requirements and standards for reclamation of these disturbed lands. Also mandates that the legislature establish the resource indemnity trust, which is to be funded by taxes imposed on the extraction of natural resources. The principal of the resource indemnity trust is required, under this section, to remain inviolate in the amount of one hundred million dollars.

Montana Code Annotated (MCA)

7-12-4102	Authorizes cities and towns to create special improvement districts to aid in the construction of natural gas and electric distribution lines.
7-13-2101	Authorizes counties to permit use of highway right of way for natural gas transmission lines.
15-23-601	The oil and gas net proceeds tax; provides for a tax on the net proceeds from the sale of oil and gas produced from any well during the preceding calendar year. Section 15-23-612 provides for an exemption from the tax for certain "new production," which means the production of natural gas, petroleum, or other crude or mineral oil from any well drilled after June 30, 1985, or that has not produced natural gas, petroleum, or other crude or mineral oil during the five years immediately preceding the first month of qualified new production.[5]
15-36-101	The oil and natural gas severance taxes; provides for state and local government severance taxes on the gross value of petroleum and other mineral crude oil and natural gas. Also provides for the allocation of tax revenue to state and local governments with certain exemptions and incentives for new production.[6]
15-38-101	The "Montana Resource Indemnity Trust Act"; the purpose of which is to indemnify the citizens of Montana for the loss of long term value resulting from the depletion of Montana's mineral resource base and for damage caused by mineral development. This section establishes a permanent resource indemnity trust, funded through revenues generated from a tax levied on mineral extraction. Proceeds from the trust are to be expended for the purpose of protecting and restoring the environment from damages resulting from mineral development, and supporting a variety of economic development programs to benefit Montana and its citizens.

[5] See Page 134 for the specific rates and details of the oil and gas net proceeds tax.

[6] See Pages 135 and 137 for the specific rates and details of the state oil and gas severance tax, and Page 139 for the local government severance tax.

Contains provisions which specify the amount of tax to be paid on different types of mineral production.

15-70-101 Gasoline license and special fuels tax; general provisions relating to gasoline and vehicle fuels taxes. Provides for a basic gasoline license tax with a rate of 1 cent per gallon for each gallon of aviation fuel and 20 cents per gallon for each gallon of other types of fuel. This Part also imposes a tax on the use of diesel and other special fuels, and establishes licensing requirements for special fuels dealers. Under this Part, diesel fuel is taxed at a rate of 20 cents per gallon, and compressed natural gas is taxed at a rate of 7 cents per 120 cubic feet. This Part also contains the "Alcohol Tax Incentive and Administration Act of 1983."

15-71-101 Provides for a tax on motor vehicles propelled by liquefied petroleum gas.

30-14-701 Sets forth prohibitions against certain fraudulent acts in connection with the finances of mining and oil companies, including (1) failure to spend at least 75% of the money raised from the sale of public securities on either the actual operation and development of the oil or mining property, or on the construction of treating plants or payments on state property; (2) failure to apply net earnings to either a reserve fund, the distribution of dividends, the liquidation of bona fide indebtedness, or reasonable development of the properties; or (3) operating holding companies so as to deprive stockholders of the parent company of their interest in its earnings.

77-3-401 Authorizes the Board of Land Commissioners to lease state lands for the purposes of oil and gas exploration and production; imposes certain limitations and requirements on oil and gas leases and generally empowers the Board with broad authority over oil and gas leasing and production on state lands.

82-10-101 Regulates the payment of royalties of oil and gas lessees and producers to the owners of oil and gas royalty interests; gives owners of royalty interests certain remedies, including the right to an accounting, and requires that certain information be provided by the oil and gas producer upon making royalty payments.

82-11-101	Provides for the regulation of the industry by the Board of Oil and Gas Conservation. The Board of Oil and Gas Conservation is given broad regulatory authority with respect to such matters as rule making, operations, well spacing, pooling and unit operations, and is the state agency designated to participate on behalf of the State of Montana in the implementation of the Natural Gas Policy Act of 1978.
82-11-131	The oil and gas privilege and license tax; authorizes the imposition of a privilege and license tax for the purpose of funding the operations of the Board of Oil and Gas Conservation. The tax is to be collected by the Department of Revenue in the same manner as the Department collects the oil and gas severance tax under Chapter 36 of Title 15. The tax may not exceed 2/10th of 1% of the market value of each barrel of crude petroleum or each 10,000 cubic feet of natural gas produced.[7]
82-11-161	Establishes the oil and gas production damage mitigation account within the state special revenue fund. Interest income from the resource indemnity trust fund is used to fund the oil and gas production damage mitigation account, which is administered by the Board of Oil and Gas Conservation. The funds may be used to, among other things, reclaim and restore land which is damaged or disturbed by operations in connection with the production of oil and natural gas.
82-15-201	Proscribes price discrimination in connection with the sale of standard petroleum products, including fuel oil, by any person, firm, company, association or corporation doing business in Montana and engaged in the selling of or dealing in standard petroleum products. Requires such persons, associations, companies or corporations to treat a customer in one part of the state on an equal basis with customers in other parts of the state; creates civil and criminal penalties for violations.
90-2-101	"Renewable Resource Development Loans, Grants and Bonds"; authorizes the use of revenues from taxation of

[7] See Pages 135 and 137 for the specific rates and details of the oil and gas privilege and license tax.

nonrenewable energy sources for the purpose of investing in an account from which loans and grants may be made to encourage the development of programs utilizing renewable resources and as compensation for the depletion of non-renewable resources.

90-2-1101 "Reclamation and Development Grants Program Act"; authorizes the Department of Natural Resources and Conservation to fund projects which will indemnify the people of Montana against the effects of oil and gas and other mineral development, and to repair and mitigate environmental damage resulting from the extraction of non-renewable resources.

Administrative Rules of Montana (ARM)

18.9.101 Rules implementing the gasoline distributors license tax.

18.9.201 Rules implementing certain exemptions from the gasoline distributors license tax (for intrastate and other deliveries).

18.9.301 Rules implementing a procedure for obtaining refunds of the gasoline license tax for certain activities other than propelling motor vehicles on public roads.

18.9.401 Provides for tax treatment of gasohol (but not ethanol) as gasoline.

18.10.101 Rules implementing the special fuels use tax.

18.10.201 Provides for certain exemptions from special fuels use tax.

18.10.301 Rules implementing a permitting procedure for special fuel use on public highways; imposes certain record keeping requirements on users.

18.10.401 License and reporting requirements for special fuel dealers; regulation of dispensation by means of "cardtrol" and "keylock" systems.

18.10.501 Definition of and payment of license tax on vehicles propelled by liquefied petroleum gas.

36.19.101	Rules for administration of the "Reclamation and Development Grants Program Act."
42.21.137	Rules for the valuation of seismograph units and allied equipment and establishing a trended depreciation schedule for such equipment.
42.21.138	Rules for the valuation of oil and gas field machinery and equipment and establishing a trended depreciation schedule for such equipment.
42.21.139	Rules for the valuation of oil and gas workover and service rigs and establishing a trended depreciation schedule for such equipment.
42.21.140	Rules for the valuation of oil drilling rigs and establishing a trended depreciation schedule for such equipment.
42.25.1001	Rules implementing the net proceeds tax on oil and gas.
42.25.1201	Rules implementing the state and local severance tax on oil and gas production and providing for certain incentives for stripper well and new well production.
42.25.1303	Rules implementing the severance tax on oil produced from a tertiary recovery project.
42.25.1401	Rules for allocating oil and gas severance taxes to local governments.
42.32.101	Rules implementing the "Montana Resource Indemnity Trust Act."

Part 3
URANIUM

1.3.1 EXPLORATION

Montana Code Annotated (MCA)

77-3-101 Authorizes the Board of Land Commissioners to issue prospecting permits and enter into mining leases for the exploration for and extraction of uranium, uraninite, pitchblend, and other uranium containing substances on state lands.

Administrative Rules of Montana (ARM)

26.2.201 General rules for permitting for mineral exploration and leasing for mineral extraction and development on state lands.

1.3.2 PRODUCTION, DEVELOPMENT AND ENVIRONMENTAL REGULATION

Constitutional Provisions

Article IX, Section 2

Constitutional provision which requires that all lands which are disturbed by the taking of natural resources be reclaimed. Requires the legislature to provide effective requirements and standards for reclamation of these disturbed lands. Also mandates that the legislature establish the resource indemnity trust, which is to be funded by taxes imposed on the extraction of natural resources. The principal of the resource indemnity trust is required, under this section, to remain inviolate in the amount of one hundred million dollars.

Montana Code Annotated (MCA)

75-2-101 The "Clean Air Act of Montana"; a permitting process administered primarily by the Department of Health and Environmental Sciences to assure compliance with both ambient air and emission standards which may apply to any uranium mining operation.

75-3-301	Prohibits any individual, corporation or other entity (including governmental entities) from disposing of large quantities of radioactive material in the state of Montana; expresses a legislative policy of the state to protect the public health and safety by means of prohibiting the disposal of certain radioactive materials within the state.
75-5-101	The "Montana Water Quality Act"; implements a policy of conserving water resources and protecting water quality; establishes a permitting process administered by the Department of Health and Environmental Sciences for discharge of mining and industrial waste water; provides for enforcement, appeals and penalties for violations of standards.
75-20-101	The "Montana Major Facility Siting Act"; the policy and purpose of which is to assure for present and future generations a clean and healthful environment and to prevent the unreasonable depletion and degradation of the state's natural resources. Implements a certification process, administered primarily by the Departments of Natural Resources and Conservation and Health and Environmental Sciences, for any new construction or modification of an energy conversion facility. "Facilities," with certain exceptions, are defined as any plant, unit or other facility having certain specified minimum capabilities. (In the case of uranium, any facility for the enriching of uranium minerals having an estimated cost in excess of $10 million are subject to the provisions of the Act. There is a specific exemption for facilities subject to the Montana Strip and Underground Mine Reclamation Act in 75-20-104(10)(a).)
77-3-101	Authorizes the Board of Land Commissioners to issue prospecting permits and enter into mining leases for the exploration for and extraction of uranium, uraninite, pitchblend, and other uranium containing substances on state lands.
82-4-101	The "Strip and Underground Mine Siting Act"; authorizes the Department of State Lands to review and regulate new strip-mine and underground-mine site location and reclamation plans. Imposes permit requirements for strip and underground mines, and provides for the termination and suspension of permits for noncompliance with this part.

82-4-201	The "Montana Strip and Underground Mine Reclamation Act"; creates a permitting process for strip and underground mining (including uranium mining) administered by the Department of State Lands; permit applications must contain comprehensive reclamation plans for all affected land; investigative and enforcement powers are given to the Department.

Administrative Rules of Montana (ARM)

12.5.102	Sets forth Montana Fish & Game Commission statement of policy relative to natural resource development.
16.2.501	Department of Health and Environmental Sciences rules for administering the "Major Facility Siting Act."
16.20.1101	Rules implementing a permit system to control ground water pollution related to in-situ solution uranium mining.
26.2.201	General rules for permitting for mineral exploration and leasing for mineral extraction and development on state lands.
26.2.401	Fee schedule for applications for and leases and easements on state lands.
26.2.501	Rent and royalty charges for oil and gas, coal and uranium leases on state lands.
26.3.501	Rules governing uranium leasing on state lands.
26.4.301	Rules implementing the "Montana Strip and Underground Mine Reclamation Act."
26.4.1801	Rules implementing the "Strip and Underground Mine Siting Act."
36.7.301	DNRC rules for administering the "Major Facility Siting Act."

1.3.3 TAXATION AND FISCAL PROGRAMS

Constitutional Provisions

Article IX, Section 2

Constitutional provision which requires that all lands which are disturbed by the taking of natural resources be reclaimed. Requires the legislature to provide effective requirements and standards for reclamation of these disturbed lands. Also mandates that the legislature establish the resource indemnity trust, which is to be funded by taxes imposed on the extraction of natural resources. The principal of the resource indemnity trust is required, under this section, to remain inviolate in the amount of one hundred million dollars.

Montana Code Annotated (MCA)

15-23-801 The metal mines gross proceeds tax; imposes upon each person, corporation or other entity engaged in the mining or extracting of uranium and other metals a tax on the gross metal yield from each mining property owned or worked during the preceding calendar year. The tax is based upon the merchantable value of all metal production from the previous calendar year.[8]

15-37-101 The metalliferous mines license tax; imposes a license tax on the gross value of product of uranium and other metalliferous metals extracted and sold by any person, corporation or other entity engaged in the business of working or mining property in this state.[9]

15-38-101 The "Montana Resource Indemnity Trust Act"; the purpose of which is to indemnify the citizens of Montana for the loss of long term value resulting from the depletion of Montana's mineral resource base and for damage caused by mineral development. This section establishes a permanent resource indemnity trust, funded through revenues generated from a tax levied on mineral extraction. Proceeds

---

[8] See Page 141 for the specific rates and details of the metal mines gross proceeds tax.

[9] See Page 142 for the specific rates and details of the metalliferous mines license tax.

from the trust are to be expended for the purpose of protecting and restoring the environment from damages resulting from mineral development, and supporting a variety of economic development programs to benefit Montana and its citizens. Contains provisions which specify the amount of tax to be paid on different types of mineral production.

Administrative Rules of Montana (ARM)

36.19.101	Rules for administering the "Reclamation and Development Grants Program Act."
42.21.132	Provides that all machinery and equipment used in the mining process shall be classified as class 8 property for property tax purposes; and establishes a depreciation formula.
42.32.101	Rules implementing the "Montana Resource Indemnity Trust Act."

CHAPTER 2 - RENEWABLE RESOURCES

Part 1
HYDROELECTRIC

2.1.1 PRODUCTION, DEVELOPMENT AND ENVIRONMENTAL REGULATION

Montana Code Annotated (MCA)

75-5-101 The "Montana Water Quality Act"; implements a policy of conserving water resources and protecting water quality; establishes a permitting process administered by the Department of Health and Environmental Sciences; and providing for enforcement, appeals and penalties for violations of standards.

75-7-101 The "Natural Streambed and Land Preservation Act of 1975"; implements a legislative policy that the natural rivers and streams of this state and their riparian areas be protected and preserved in their natural or existing state; establishes a permitting process administered by the Department of Fish, Wildlife & Parks applicable to projects which contemplate a physical alteration or modification of a river or stream.

75-20-101 The "Montana Major Facility Siting Act"; the policy and purpose of which is to assure for present and future generations a clean and healthful environment and to prevent the unreasonable depletion and degradation of the state's natural resources. Implements a certification process, administered primarily by the Departments of Natural Resources and Conservation and Health and Environmental Sciences, for any new construction or modification of an energy conversion facility. "Facilities," with certain exceptions, are defined as any plant, unit or other facility having certain specified minimum capabilities. (In the case of hydroelectric power generation, any dam or other facility generating 50 megawatts of electricity or more, or any addition thereto having an estimated cost in excess of $10 million, are subject to the provisions of the Act. For dams and other facilities subject to the jurisdiction of the Federal Energy Regulatory Commission (FERC), the Department of

Natural Resources and Conservation is required, on behalf of the State of Montana, to file with FERC a recommendation on the project.)[10]

77-4-201 — Provisions relating to the development of hydroelectric resources on state lands. Authorizes the Board of Land Commissioners to lease state lands or issue licenses for the development of "power sites" for the generation of hydroelectric energy.

85-1-501 — Requires the Department of Natural Resources and Conservation to assess the economic and environmental feasibility of constructing and operating small scale hydroelectric power generating facilities on each of the existing water projects currently under its control. Requires that these studies be periodically updated to provide for the rising cost of electrical energy. This section also sets forth requirements for lease applications and requires the board to publish availability notices for lease sites which have been determined to be feasible locations for hydroelectric power generation.

85-2-301 — Provisions of the "Montana Water Use Act" establishing an application and permitting process administered by the Department of Natural Resources and Conservation for the appropriation of surface water for storage in reservoirs and for hydroelectric power generation.

85-15-101 — The "Montana Dam Safety Act"; implements a permitting process administered by the Department of Natural Resources and Conservation to identify "high hazard dams"; implements a procedure for construction monitoring and periodic inspection of high hazard dams; imposes liability upon dam owners and operators for damage incident to leakage or overflow, and prescribes penalties for violation of the Act.

Administrative Rules of Montana (ARM)

12.5.102 — Sets forth Montana Fish & Game Commission statement of policy relative to natural resource development.

[10] See the Federal Power Act, 16 USC 791a, et seq.

16.20.101 Department of Health and Environmental Sciences rules for implementing and administering the "Montana Water Quality Act." Subchapter 6 sets forth the specific water quality standards, and Subchapter 7 contains the "non-degradation" requirements.

26.2.201 General rules for leasing, licensing and permitting for uses of state lands, including hydroelectric energy generation.

26.2.401 Fee schedule for applications for and leases and easements on state lands.

36.2.401 DNRC rules establishing minimum standards and guidelines for the implementation of the "Natural Streambed and Land Preservation Act of 1975."

36.12.101 DNRC rules for the administration of the "Montana Water Use Act" and its permitting procedures for appropriations of water.

36.14.101 DNRC rules for implementing the "Montana Dam Safety Act."

2.1.2 TAXATION AND FISCAL PROGRAMS

Montana Code Annotated (MCA)

85-1-220 Mandates that all revenues derived from hydro-electric power generation at state water conservation projects be paid into the state water project hydroelectric power generation special revenue account established under 17-2-102, MCA; authorizes the Department of Natural Resources and Conservation to transfer funds from that account to service the debt incurred in connection with state water project bonds.

90-2-101 "Renewable Resource Development Loans, Grants and Bonds"; authorizes the taxation of nonrenewable energy sources for the purpose of investing the revenues generated in an account from which loans and grants are made to encourage the replacement of nonrenewable resources with renewable resource development programs, including hydroelectric projects.

90-2-1101 The "Reclamation and Development Grants Program Act"; implements a legislative policy of funding projects designed to indemnify Montana citizens for the impact of mineral development. Section 90-2-1112(2)(a) authorizes, under certain circumstances, grants for projects that "enhance Montana's economy through the development of natural resources," which could include a qualifying hydroelectric project.

90-4-101 Implements a program administered by DNRC designed to promote research and development of energy conservation and renewable energy sources, and provides funding to meet this objective. Establishes the alternative energy and energy conservation research development and demonstration account funded by repayments of grants and loans which have been awarded from the account. DNRC must allocate the funds to five statutory loan and grant categories, but has the discretion to reallocate to insure that the program offers the greatest possible benefits during a particular fiscal year.

Administrative Rules of Montana (ARM)

36.8.101 Rules for administering the "Renewable Energy Grant and Loan Program" aimed at effectuating the statement of legislative policy in 90-4-101, MCA; establishing the renewable energy advisory council.

36.18.101 DNRC rules for the implementation of the "Renewable Resource Development Loan, Grant and Bond Program" (90-2-101, et seq., MCA).

36.19.101 DNRC rules for the implementation of the "Reclamation and Development Grants Program" (90-2-1101, et seq., MCA).

Part 2
SOLAR

2.2.1 PRODUCTION, DEVELOPMENT AND ENVIRONMENTAL REGULATION

Montana Code Annotated (MCA)

70-17-301 Imposes certain conditions on easements created for the purpose of insuring the unencumbered exposure of solar energy devices across real property in connection with the generation of solar energy. Solar energy easements are required to be in writing and must include, among other things, the vertical and horizontal angles, expressed in degrees, at which the solar easement extends over the servient tenement, and any terms or conditions under which the solar easement is granted or may be terminated.

Administrative Rules of Montana (ARM)

Not Applicable.

2.2.2 TAXATION AND FISCAL PROGRAMS

Montana Code Annotated (MCA)

15-6-201 Provides a property tax exemption, based on the value of the system, for a "recognized non-fossil" energy generation system installed in any type of building after January 1, 1979.

15-32-103 Specific provision allowing a deduction from gross corporate income for computation of net income for expenditures for capital investments in buildings for energy conservation purposes in accordance with a specific schedule set forth in the statute.

15-32-109 This section provides a resident individual taxpayer with a credit against state income tax for expenditures for capital investments in a building for energy conservation purposes in accordance with a specific schedule set forth in the statute.

15-32-201 Provides an income tax credit for individual taxpayers who install in the taxpayer's principle dwelling an energy system using a recognized non-fossil form of energy generation. A ceiling on the credit is fixed at 10% of the first $1,000 and 5% of the next $3,000 of the cost of the system, and provides for carry-overs of unused credit to succeeding tax years.

90-2-101 "Renewable Resource Development Loans, Grants and Bonds"; authorizes the taxation of nonrenewable energy sources for the purpose of investing the revenues generated in an account from which loans and grants are made to encourage the replacement of nonrenewable resources with renewable resource development programs.

90-2-1101 The "Reclamation and Development Grants Program Act"; implements a legislative policy of funding projects designed to indemnify Montana citizens for the impact of mineral development. Section 90-2-1112(2)(a) authorizes, under certain circumstances, grants for projects that "enhance Montana's economy through the development of natural resources," which could include a qualifying solar energy project.

90-4-101 Implements a program administered by DNRC designed to promote research and development of energy conservation and renewable energy sources, and provides funding to meet this objective. Establishes the alternative energy and energy conservation research development and demonstration account funded by repayments of grants and loans which have been awarded from the account. DNRC must allocate the funds to five statutory loan and grant categories, but has the discretion to reallocate to insure that the program offers the greatest possible benefits during a particular fiscal year.

<u>Administrative Rules of Montana (ARM)</u>

36.8.101 Rules for administering the "Renewable Energy Grant and Loan Program" aimed at effectuating the statement of legislative policy in 90-4-101, MCA; establishing the renewable energy advisory council.

36.18.101	DNRC rules for the implementation of the "Renewable Resource Development Loan, Grant and Bond Program" (90-2-101, et seq., MCA).
36.19.101	DNRC rules for the implementation of the "Reclamation and Development Grants Program" (90-2-1101, et seq., MCA).
42.4.101	Department of Revenue rules implementing tax credits for non-fossil fuel energy generation systems.

2.3.1 PRODUCTION, DEVELOPMENT AND ENVIRONMENTAL REGULATION

Montana Code Annotated (MCA)

70-17-303 Imposes certain conditions on easements created for the purpose of insuring the flow of wind across real property in connection with the generation of wind energy. Wind energy easements are required to be in writing and must include, among other things, a description of both the servient and dominant tenements, a description of the dimensions of the easement, both horizontally and vertically, specify the restrictions imposed on the servient tenement, and specify the terms, if any, under which the easement may be modified or terminated.

75-20-101 The "Montana Major Facility Siting Act"; the policy and purpose of which is to assure for present and future generations a clean and healthful environment and to prevent the unreasonable depletion and degradation of the state's natural resources. Implements a certification process, administered primarily by the Departments of Natural Resources and Conservation and Health and Environmental Sciences, for any new construction or modification of an energy conversion facility. "Facilities," with certain exceptions, are defined as any plant, unit or other facility having certain specified minimum capabilities. (In the case of wind energy generation projects, facilities generating 50 megawatts or more of electricity or additions thereto having an estimated cost in excess of $10 million are subject to the provisions of the Act.)

Administrative Rules of Montana (ARM)

16.2.501 Department of Health and Environmental Sciences rules for administering the "Major Facility Siting Act."

16.20.101 Department of Health and Environmental Sciences rules for implementing and administering the "Montana Water Quality Act." Subchapter 6 sets forth the specific water

quality standards, and Subchapter 7 contains the "non-degradation" requirements.

26.2.201 General rules for leasing, licensing and permitting for uses of states lands (which ostensibly could include large-scale wind energy development).

26.2.401 Fee schedule for applications for and leases and easements on state lands.

36.6.301 DNRC rules for administering the "Major Facility Siting Act."

2.3.2 TAXATION AND FISCAL PROGRAMS

Montana Code Annotated (MCA)

15-32-201 Provides an income tax credit for individual taxpayers who install in the taxpayer's principle dwelling an energy system using a recognized non-fossil form of energy generation. A ceiling on the credit is fixed at 10% of the first $1,000 and 5% of the next $3,000 of the cost of the system, and provides for carry-overs of unused credit to succeeding tax years.

15-32-401 Contains a statement of legislative policy to encourage the development of a wind energy industry in Montana. Provides for an investment tax credit to any individual, corporation, partnership, or small business corporation that makes an investment of $5,000 or more for a commercial system which generates electricity by means of wind power. With certain limitations, a credit against individual or corporate income tax of up to 35% of the eligible costs of the system may be taken as a credit against taxes on taxable net income produced by certain specified activities related to wind energy.

90-2-101 "Renewable Resource Development Loans, Grants and Bonds"; authorizes the taxation of nonrenewable energy sources for the purpose of investing the revenues generated in an account from which loans and grants are made to encourage the replacement of nonrenewable resources with renewable resource development programs.

90-2-1101	The "Reclamation and Development Grants Program Act"; implements a legislative policy of funding projects designed to indemnify Montana citizens for the impact of mineral development. Section 90-2-1112(2)(a) authorizes, under certain circumstances, grants for projects that "enhance Montana's economy through the development of natural resources," which could include a qualifying wind energy project.
90-4-101	Implements a program administered by DNRC designed to promote research and development of energy conservation and renewable energy sources, and provides funding to meet this objective. Establishes the alternative energy and energy conservation research development and demonstration account funded by repayments of grants and loans which have been awarded from the account. DNRC must allocate the funds to five statutory loan and grant categories, but has the discretion to reallocate to insure that the program offers the greatest possible benefits during a particular fiscal year.

Administrative Rules of Montana (ARM)

36.8.101	Rules for administering the "Renewable Energy Grant and Loan Program" aimed at effectuating the statement of legislative policy in 90-4-101, MCA; establishing the renewable energy advisory council.
36.18.101	DNRC rules for the implementation of the "Renewable Resource Development Loan, Grant and Bond Program" (90-2-101, et seq., MCA).
36.19.101	DNRC rules for the implementation of the "Reclamation and Development Grants Program" (90-2-1101, et seq., MCA).
42.4.101	Department of Revenue rules implementing tax credits for non-fossil fuel energy generation systems.

Part 4
GEOTHERMAL

2.4.1 PRODUCTION, DEVELOPMENT AND ENVIRONMENTAL REGULATION

Montana Code Annotated (MCA)

75-20-101	The "Montana Major Facility Siting Act"; the policy and purpose of which is to assure for present and future generations a clean and healthful environment and to prevent the unreasonable depletion and degradation of the state's natural resources. Implements a certification process, administered primarily by the Departments of Natural Resources and Conservation and Health and Environmental Sciences, for any new construction or modification of an energy conversion facility. "Facilities," with certain exceptions, are defined as any plant, unit or other facility having certain specified minimum capabilities. (In the case of geothermal power generation, any dam or other facility generating 50 megawatts of electricity or more, or any addition thereto having an estimated cost in excess of $10 million, is subject to the provisions of the Act. For dams and other facilities subject to the jurisdiction of the Federal Energy Regulatory Commission (FERC), the Department of Natural Resources and Conservation is required, on behalf of the State of Montana, to file with FERC a recommendation on the project.)
75-20-1001	Directs the Board of Natural Resources and Conservation to regulate geothermal exploration.
77-4-101	Provisions relating to the development of geothermal resources located on state lands. This section authorizes the Board of Land Commissioners to lease state lands for prospecting, exploration, well construction, and production of geothermal resources.
85-2-301	Provisions of the "Montana Water Use Act" establishing an application and permitting process administered by the Department of Natural Resources and Conservation for the appropriation of surface water for storage in reservoirs and for hydroelectric power generation.

Administrative Rules of Montana (ARM)

16.2.501	Department of Health and Environmental Sciences rules for administering the "Major Facility Siting Act."
26.2.201	General rules for leasing, licensing and permitting for uses of state lands (including geothermal exploration and development.)
26.2.401	Fee schedule for applications for and leases and easements on state lands.
36.6.301	DNRC rules for administering the "Major Facility Siting Act."
36.12.101	DNRC rules for the administration of the "Montana Water Use Act" and its permitting procedures for appropriations of water.
26.3.401	Specific Department of State Lands rules governing leases of state lands relative to geothermal resources.

2.4.2 TAXATION AND FISCAL PROGRAMS

Montana Code Annotated (MCA)

15-32-115	Provides for a credit against individual income tax liability for taxpayers who install in their principal residence a geothermal energy generation system. A credit of up to $250 per year for four years against the taxpayer's income tax liability is authorized.
15-32-201	Provides an income tax credit for individual taxpayers who install in the taxpayer's principle dwelling an energy system using a recognized non-fossil form of energy generation. A ceiling on the credit is fixed at 10% of the first $1,000 and 5% of the next $3,000 of the cost of the system, and provides for carry-overs of unused credit to succeeding tax years.
90-2-101	"Renewable Resource Development Loans, Grants and Bonds"; authorizes the taxation of nonrenewable energy sources for the purpose of investing the revenues generated in an account from which loans and grants are made to

encourage the replacement of nonrenewable resources with renewable resource development programs.

90-2-1101 — The "Reclamation and Development Grants Program Act"; implements a legislative policy of funding projects designed to indemnify Montana citizens for the impact of mineral development. Section 90-2-1112(2)(a) authorizes, under certain circumstances, grants for projects that "enhance Montana's economy through the development of natural resources," which could include a qualifying geothermal energy project.

90-4-101 — Implements a program administered by DNRC designed to promote research and development of energy conservation and renewable energy sources, and provides funding to meet this objective. Establishes the "alternative energy and energy conservation research development and demonstration account" funded by repayments of grants and loans which have been awarded from the account. DNRC must allocate the funds to five statutory loan and grant categories, but has the discretion to reallocate to insure that the program offers the greatest possible benefits during a particular fiscal year.

Administrative Rules of Montana (ARM)

36.8.101 — Rules for administering the "Renewable Energy Grant and Loan Program" aimed at effectuating the statement of legislative policy in 90-4-101, MCA; establishing the renewable energy advisory council.

36.18.101 — DNRC rules for the implementation of the "Renewable Resource Development Loan, Grant and Bond Program" (90-2-101, et seq., MCA).

36.19.101 — DNRC rules for the implementation of the "Reclamation and Development Grants Program" (90-2-1101, et seq., MCA).

Part 5
BIOMASS

2.5.1 PRODUCTION, DEVELOPMENT AND ENVIRONMENTAL REGULATION

Montana Code Annotated (MCA)

See **2.5.2 TAXATION AND FISCAL PROGRAMS** below.

Administrative Rules of Montana (ARM)

See **2.5.2 TAXATION AND FISCAL PROGRAMS** below.

2.5.2 TAXATION AND FISCAL PROGRAMS

Montana Code Annotated (MCA)

15-6-135	Provides for the classification of gasohol production facilities, during construction and for the first three years of operation, as class 5 property, taxable at 3% of market value.
15-6-201	Provides a property tax exemption, based on the value of the system, for a "recognized non-fossil" energy generation system installed in any type of building after January 1, 1979.
15-32-201	Provides an income tax credit for individual taxpayers who install in the taxpayer's principle dwelling an energy system using a recognized non-fossil form of energy generation. A ceiling on the credit is fixed at 10% of the first $1,000 and 5% of the next $3,000 of the cost of the system, and provides for carry-overs of unused credit to succeeding tax years. Section 15-32-102(6) defines qualifying "low emission wood or biomass combustion device;" Section 15-32-203 directs the Department of Revenue to adopt rules establishing certification standards for such devices.
15-70-501	The "Alcohol Tax Incentive and Administration Act of 1983"; establishes various tax incentives for the production

of alcohol to be blended for gasohol and provides for a system of record keeping.

90-2-101 "Renewable Resource Development Loans, Grants and Bonds"; authorizes the taxation of nonrenewable energy sources for the purpose of investing the revenues generated in an account from which loans and grants are made to encourage the replacement of nonrenewable resources with renewable resource development programs, including biomass projects.

90-2-1101 The "Reclamation and Development Grants Program Act"; implements a legislative policy of funding projects designed to indemnify Montana citizens for the impact of mineral development. Section 90-2-1112(2)(a) authorizes, under certain circumstances, grants for projects that "enhance Montana's economy through the development of natural resources," which could include a qualifying biomass project.

90-4-101 Implements a program administered by DNRC designed to promote research and development of energy conservation and renewable energy sources, and provides funding to meet this objective. Establishes the alternative energy and energy conservation research development and demonstration account funded by repayments of grants and loans which have been awarded from the account. DNRC must allocate the funds to five statutory loan and grant categories, but has the discretion to reallocate to insure that the program offers the greatest possible benefits during a particular fiscal year.

Administrative Rules of Montana (ARM)

18.9.401 Rules providing for tax treatment of gasohol (but not ethanol) as gasoline.

18.9.501 Rules imposing on alcohol distributors responsibility for collection and remittance of the tax on alcohol imposed under 15-70-204, MCA.

18.9.601 Rules implementing the "Alcohol Tax Incentive and Administration Act."

36.8.101	DNRC rules for the implementation of the "Renewable Energy Grant and Loan Program" (90-4-101, et seq., MCA).
36.18.101	DNRC rules for the implementation of the "Renewable Resource Development Loan, Grant and Bond Program" (90-2-101, et seq., MCA).
36.19.101	DNRC rules for administering the "Reclamation and Development Grants Program" established under 90-2-1101, et seq., MCA.
42.4.101	Department of Revenue rules implementing tax credits for non-fossil fuel energy generation systems.
42.19.1102	Provides that gasohol production facilities do not receive the property tax exemption provided by Section 15-6-201, MCA, but may be classified under Section 15-6-135, MCA, as class 5 property. Also provides that anhydrous ethanol production facilities which produce ethanol from solid or organic wastes may receive the property tax exemption provided for in Section 15-6-135, MCA, as well as classification as class 5 property. Anhydrous ethanol production facilities utilizing grain to produce ethanol are not entitled to the property tax exemption provided for in Section 15-6-201, MCA, but may be classified as class 5 property.
42.27.401	Rules implementing provisions of 15-70-201, et seq., MCA, requiring the taxation of gasohol at the statutory rate for gasoline (by definition, pursuant to ARM 42.27.403, 100% anhydrous ethanol is not considered to be gasohol).
42.27.501	Rule imposing upon alcohol distributors responsibility to collect and remit to the Department of Revenue the tax on alcohol pursuant to 15-70-204, MCA.
42.27.601	Rules implementing the "Alcohol Tax Incentive and Administration Act of 1983."

Part 6
COGENERATION

2.6.1 PRODUCTION, DEVELOPMENT AND ENVIRONMENTAL REGULATION

Montana Code Annotated (MCA)

69-3-601 Public Service Commission regulation of "qualifying small power production facilities;" authorizes cogeneration by qualifying small power production facilities and the sale of such electricity under rates and conditions prescribed by the Commission.

Administrative Rules of Montana (ARM)

38.5.1901 Public Service Commission rule adopting and incorporating by reference certain rules from Title 18 of the Code of Federal Regulations promulgated pursuant to the Public Utility Regulatory Policies Act of 1978 (PURPA), Pub. L. 95-617; and establishing rules for the participation by qualifying small power production facilities and arrangements for purchases and sales of electric power with electric utilities under the regulation of the Public Service Commission.

2.6.2 TAXATION AND FISCAL PROGRAMS

Montana Code Annotated (MCA)

69-3-601 See Section 2.6.1, supra.

Administrative Rules of Montana (ARM)

38.5.1901 See Section 2.6.1, supra.

CHAPTER 3 - ELECTRIC ENERGY

Part 1
TRANSMISSION

3.1.1 LOCATION, DEVELOPMENT, AND ENVIRONMENTAL REGULATION

Montana Code Annotated (MCA)

75-20-101	The "Montana Major Facility Siting Act"; the policy and purpose of which is to assure for present and future generations a clean and healthful environment and to prevent the unreasonable depletion and degradation of the state's natural resources. Implements a certification process, administered primarily by the Departments of Natural Resources and Conservation and Health and Environmental Sciences, for any new construction or modification of an energy conversion facility. "Facilities," with certain exceptions, are defined as any plant, unit or other facility having certain specified minimum capabilities. (In the case of electric energy transmission facilities, with certain exceptions, facilities having a design capacity of more than 69 kilovolts are subject to the provisions of the Act.)
77-2-101	Authorizes the Board of Land Commissioners to grant easements on state lands and requires the Board to fix the fees and charges therefor.

Administrative Rules of Montana (ARM)

16.2.501	Department of Health and Environmental Sciences rules for administering the "Major Facility Siting Act."
26.2.201	General rules for leasing, licensing and permitting for uses of state lands.
26-2-502	Sets forth minimum fees for right of way easements for electric transmission lines.
36.6.301	DNRC rules for administering the "Major Facility Siting Act."

3.1.2 TAXATION AND FISCAL PROGRAMS

Montana Code Annotated (MCA)

7-12-4102	Authorization for cities and towns to create special improvement districts to aid in the construction of natural gas and electric distribution lines.
15-24-1203	The "Beneficial Use Tax," imposing a use or privilege tax upon the beneficial use of certain high-voltage electric transmission lines and associated facilities (having a design capacity of 500 kilovolts or more) owned by the United States but beneficially used by any private individual, association, or corporation.
15-51-101	Electric energy producer's license tax; imposes a tax on electric energy producers. Imposes the tax on each entity engaged in the generation, manufacture or production of electricity and electrical energy in the state of Montana. The amount of tax assessed is dependent upon the gross amount of energy produced, with an exception for the actual amount of energy which is necessary for plant service. The tax imposed under this chapter is $.0002 per kilowatt hour on all electricity and electrical energy generated, manufactured or produced, as measured at the place of production.
90-4-401	Legislative expression of agreement to participate in the Pacific Northwest Electric Power Planning and Conservation Act, and the Pacific Northwest Electric Power and Conservation Planning Council. Authorizes the governor to appoint two members to the council. Mandates that the Council conduct public hearings in connection with any "major" resource acquisition as defined in 16 U.S.C. § 839a.

Administrative Rules of Montana (ARM)

42.22.107	Rules imposing reporting requirements on qualifying companies subject to the "beneficial use tax" (15-24-1203, MCA) by virtue of their possession or other beneficial use of federally owned high-voltage transmission lines.
42.25.1601	Provides for deduction of kilowatt hours used for station service requirements from electric energy producer's license tax. Precludes deduction for line losses.

CHAPTER 4 - CONSERVATION

Part 1
PRIVATE SECTOR

4.1.1 TAXATION, INCENTIVES AND FISCAL PROGRAMS

Constitutional Provisions

Article IX, Section 5

Constitutional provision providing for the creation of the coal severance tax trust fund, from which funding is provided for certain grant and loan programs to promote conservation. This provision requires the legislature to dedicate not less than one-fourth of the coal severance tax proceeds to the trust, from which interest and income may be appropriated. This provision also requires that the trust principal remain intact unless appropriated by three-fourths of the members of each house of the legislature. One half (50%) of the severance tax has been dedicated to the coal severance tax trust fund since December 31, 1979.

Montana Code Annotated (MCA)

15-30-125 Offers an individual income tax credit for energy conserving investments, as provided for in 15-32-109, under which an "energy conservation purpose" is determined as follows:

(a) in the case of an expenditure for residential building, the lesser of:

(i) $150; or,

(ii) 5% of the expenditure; and

(b) in the case of an expenditure for a building not used as a residence, the lesser of:

(i) $300; or,

(ii) 5% of the expenditure.

The credit or sum of the credits under subsection (i):

(a) may not exceed the taxpayer's tax liability; and

(b) is subject to the provisions of 15-32-104.

There is no carry-back or carry-forward of the credit permitted under this section, and the credit must be applied in the year the expenditure is incurred, as determined by the taxpayer's accounting method.

15-32-101 This section allows a tax deduction for individual taxpayers (in addition to all other deductions from gross corporate income in computing net income), which allows the taxpayer to deduct a portion of his expenditure for a capital investment in a building for an energy conservation purpose. Imposes certain limitations on deductions and credits under this section. Also provides tax credits for energy-conserving expenditures.

15-32-103 Specific provision allowing a deduction from gross corporate income for computation of net income for expenditures for capital investments in buildings for energy conservation purposes in accordance with a specific schedule set forth in the statute.

15-32-109 This section provides a resident individual taxpayer with a credit against state income tax for expenditures for capital investments in a building for energy conservation purposes in accordance with a specific schedule set forth in the statute.

15-32-603 This section allows: (1) a credit equal to 25% of an investment in depreciable property used to collect or process reclaimable material, or to manufacture a product from reclaimable material; and (2) an additional deduction equal to 5% of the expenditures for recycled material otherwise deductible as a business-related expense. The credit and the deduction provided for in this chapter may be applied either to individual income or corporate license taxes.

17-6-301 The "Montana In-State Investment Act of 1983"; expresses legislative policy and purpose of the permanent coal tax trust fund, which are to: (1) compensate future generations for the depletion of resources caused by coal development; and (2) to develop a strong economy for Montana. States that the Board of Investments shall endeavor to invest up to 25% of the fund in the Montana economy, with special emphasis on local enterprises. This section also sets forth authorized investments, limitations on investments, and preferences for investments of revenue from the coal tax trust fund, which, under Section 17-6-309(4), expressly includes energy efficiency investments.

50-60-201 Provisions of the "Montana State Building Code." This Part is designed to accomplish several objectives, including the following: encouraging, to the fullest extent feasible, the use of modern technical methods, devices, and improvements for the purpose of reducing the cost of construction, consistent with the conservation of energy and the efficient utilization of energy; to encourage efficient design and installation which will result in consumption of the least possible quantities of energy and to reduce the need for heating in the winter and air conditioning in the summer; to encourage efficient design of building envelopes with high thermal resistance and low air leakage, and to require design and selection practices which will promote the efficient use of energy. The Department of Commerce is responsible for adopting rules relating to the construction of, installation of equipment in, and standards for materials to be used in all buildings which are subject to the requirements of this Part.

69-3-701 Authorizes utilities to purchase conservation or directly engage in conservation investments which have been approved by the Public Service Commission, with the cost-effective conservation measures to be at the customer's discretion, installed by either a private firm, the customer himself, or the utility. Also authorizes the Commission to make on-site audits to insure compliance with the criteria set out in this section. Prohibits a utility which has placed the conservation in its rate base to claim a conservation tax credit.

90-2-101 "Renewable Resource Development Loans, Grants and Bonds"; authorizes the taxation of nonrenewable energy sources for the purpose of investing the revenues generated in an account from which loans and grants are made to encourage the replacement of nonrenewable resources with renewable resource development programs.

90-2-1101 The "Reclamation and Development Grants Program Act"; implements a legislative policy of funding projects designed to indemnify Montana citizens for the impacts of mineral development.

90-4-101 Implements a program administered by DNRC designed to promote research and development of energy conservation and renewable energy sources, and authorizes the receipt

of money from repayment of grants and loans "previously awarded" by the Department of Natural Resources. Establishes the "alternative energy and energy conservation research development and demonstration account," funded by repayments of grants and loans which have been awarded from the account. DNRC must allocate the funds to five statutory loan and grant categories, but has the discretion to reallocate to insure that the program offers the greatest possible benefits during a particular fiscal year.

90-4-201 Appropriates to the Department of Social and Rehabilitative Services all federal funds and grants available under the U.S. Department of Energy low-income weatherization assistance programs, U.S. Department of Health and Human Services low-income home energy assistance program, or any similar federal program designed to increase the energy efficiency of dwellings inhabited by low-income individuals. Directs the Department of Social and Rehabilitative Services to allocate at least 5% of funds received from the U.S. Department of Health and Human Services low-income home energy assistance program, if federal law allows. Provides an allocation formula for funds which are to be allocated under these provisions. Sets forth the state policy for the use of oil overcharge payments received from the federal government. Also sets forth acceptable uses for funds from the energy conservation and energy assistance account.

90-4-301 "Energy Supply Emergency Powers." Establishes the necessary planning, information gathering, and energy emergency powers for the governor and defines the conditions under which these powers are to be exercised. Also provides for the regular monitoring of energy supplies and demand. This section is intended to enable the governor and other state agencies to deal with possible energy shortage emergency situations. Grants to the governor emergency powers which are intended to enable the governor's office to gather information, to regularly monitor energy supplies and demand, to formulate plans, and to institute appropriate emergency measures designed to reduce or allocate the usage of energy. Section 90-4-303 establishes the legislative energy policy committee.

90-4-401 Legislative expression of agreement to participate in the Pacific Northwest Electric Power Planning and Conservation

Act, and the Pacific Northwest Electric Power and Conservation Planning Council. Authorizes the governor to appoint two members to the council. Mandates that the Council conduct public hearings in connection with any "major" resource acquisition as defined in 16 U.S.C. § 839a.

90-4-501 — Provides for state administration of the residential conservation program, mandated by the National Energy Conservation Policy Act of 1978. Establishes a residential conservation service, to be administered by the Montana Department of Natural Resources and Conservation.

Administrative Rules of Montana (ARM)

8.70.101 — Adopts by reference the Uniform Building Code; Appendix 53 to the Uniform Building Code adopts the CABO model energy code, also by reference.

36.8.101 — Rules for administering the "Renewable Energy Grant and Loan Program" aimed at effectuating the statement of legislative policy in 90-4-101, MCA; establishing the renewable energy advisory council.

36.18.101 — DNRC rules for the implementation of the "Renewable Resource Development Loan, Grant and Bond Program" (90-2-101, et seq., MCA).

42.23.421 — Rules implementing deduction from taxable income for corporations for expenditures for energy conservation measures in buildings, both residential and non-residential, used in the taxpayer's business.

46.14.201 — Rules for the administration and implementation of the Low-Income Weatherization Assistance Program. Requires the designated local contractor to provide a staff member to interview all applicants or persons acting on behalf of applicants who contact the offices of the local contractor for the purpose of applying for low-income weatherization assistance. Provides procedures for applications for benefits, investigations of eligibility, and procedures in processing applications.

4.2.1 TAXATION, INCENTIVES AND FISCAL PROGRAMS

Montana Code Annotated (MCA)

90-4-101 Implements a program administered by DNRC designed to promote research and development of energy conservation and renewable energy sources, and authorizes the receipt of money from repayment of grants and loans "previously awarded" by the Department of Natural Resources. Establishes the "alternative energy and energy conservation research development and demonstration account," funded by repayments of grants and loans which have been awarded from the account. DNRC must allocate the funds to five statutory loan and grant categories, but has the discretion to reallocate to insure that the program offers the greatest possible benefits during a particular fiscal year.

90-4-301 "Energy Supply Emergency Powers." Establishes the necessary planning, information gathering, and energy emergency powers for the governor and defines the conditions under which these powers are to be exercised. Also provides for the regular monitoring of energy supplies and demand. This section is intended to enable the governor and other state agencies to deal with possible energy shortage emergency situations. Grants to the governor emergency powers which are intended to enable the governor's office to gather information, to regularly monitor energy supplies and demand, to formulate plans, and to institute appropriate emergency measures designed to reduce or allocate the usage of energy. Section 90-4-303 establishes the legislative energy policy committee.

90-4-401 Legislative expression of agreement to participate in the Pacific Northwest Electric Power Planning and Conservation Act, and the Pacific Northwest Electric Power and Conservation Planning Council. Authorizes the governor to appoint two members to the council. Mandates that the Council conduct public hearings in connection with any "major" resource acquisition as defined in 16 U.S.C. § 839a.

90-4-601 The "State Building Energy Conservation Act"; requires state agencies to submit lists of facilities which have a potential for energy saving. These plans must be submitted to the DNRC by June 30th of each odd-numbered year. The DNRC then analyzes the lists submitted by the agencies and provides the governor with a prioritized list of recommended projects for funding under the energy conservation program. The governor is then required to submit a list of proposed projects to the legislature within the first week of the legislative session. This chapter also authorizes the Board of Examiners to issue and sell bonds to finance energy conservation programs, when the Board has been authorized to do so by a two-thirds vote of the legislature.

Administrative Rules of Montana (ARM)

36.8.101 Rules for administering the "Renewable Energy Grant and Loan Program" aimed at effectuating the statement of legislative policy in 90-4-101, MCA; establishing the renewable energy advisory council.

36.18.101 DNRC rules for the implementation of the "Renewable Resource Development Loan, Grant and Bond Program" (90-2-101, et seq., MCA).

CHAPTER 5 - PUBLIC SERVICE COMMISSION REGULATION

Part 1
STATUTES and RULES

Constitutional Provisions

Article XIII, Section 2

Requires the legislature to establish and fund an Office of Consumer Counsel to represent the interests of consumers before the Public Service Commission.

Montana Code Annotated (MCA)

69-1-101 Provisions relating to the definition, creation and operation of the Public Service Commission, the Consumer Committee and the Consumer Counsel. This chapter also provides for the funding of the Department of Public Service Regulation. The duty of the Public Service Commission is to supervise and regulate the operations of, among other things, public utilities which, in Montana, includes both gas and electric utilities. Funding of the Department of Public Service Regulation, under this part, is accomplished through funds generated from fees collected by all regulated companies affected by this chapter.

69-1-201 This part describes the duties and responsibilities of the Consumer Counsel and Consumer Committee. Requires the Committee to meet at least once per quarter to advise the Consumer Counsel. Authorizes members of the Committee to receive compensation and to appoint necessary employees and consultants. Also requires the Counsel to prepare and submit a yearly report, recommending remedial legislation to the Committee. Contains funding provisions for the office of the Consumer Counsel, as well as provisions governing the determination of fees to be paid by regulated companies.

69-1-401 Provisions providing for funding of the Department of Public Service Regulation. Also contains provisions providing for the determination of fees to be collected from regulated companies. Fees provided for under this Part are determined

in the manner set forth in Section 69-1-224, MCA, except that gross revenues from sales to other regulated companies for resale are excluded from the determination of the total gross operating revenue. Requires the Legislative Finance Committee to annually review the Department of Public Service Regulation's budget as well as calculations made by the Department of Revenue.

69-2-101 General regulatory provisions defining the role of the Public Service Commission and the role of the Consumer Counsel.

69-2-201 Defines the role of the Consumer Counsel; authorizes them to appear at public hearings conducted by the Public Service Commission as a representative of the consuming public. Also authorizes the Counsel to institute proceedings against regulated companies before the Commission and to participate in proceedings in state and federal courts, as well as administrative agencies, where the consuming public has such an interest in the outcome of the proceedings that representation by the Counsel in such a proceeding is appropriate. Grants the Counsel necessary investigatory authority and provides penalties for violations of this chapter.

69-3-101 Defines the term "public utility" within the meaning of this chapter; also defines the role of the Public Service Commission. Specifically grants to the Commission the power to: (1) adopt rules regarding inspections, tests, audits and investigations; (2) adopt rules governing the proceedings of the Commission; and, (3) regulate all investigations of hearings of public utilities. Also authorizes the Commission to inquire into the management of public utilities, and grants to its agents the right to inspect the books, accounts, papers, records and memoranda of any public utility and to examine under oath any officer, agent or employee of a public utility in relation to its business affairs.

69-3-201 Establishes requirements which are to be imposed upon all public utilities, including a duty to furnish service at a reasonable cost to the consumer, to keep and submit records to the Commission, to make an annual report to the Commission, and to pay the necessary fees to the Commission. This section also provides penalties for

noncompliance and for failure of a utility to cooperate with the Commission.

69-3-301 Establishes the ratemaking procedures to be adhered to by public utilities. Requires each public utility to file schedules showing rates, tolls and charges with the Commission. These reports are to be open to the public and are to include all rules adopted by the utility which will affect the rates charged. Also provides a mechanism through which consumers can lodge complaints against a public utilities provider.

69-3-401 This part sets forth the procedure through which an interested party may seek review of an order of the Commission fixing any rate, charge, classification, or any order fixing any regulation, practice or service. Also sets forth the procedure through which an aggrieved party may seek injunctive relief from an order of the Commission.

69-3-501 Provides for the issuance of security and creation of liens by public utilities that furnish electric or gas service in the State of Montana and have revenues which are derived from sources in Montana in excess of $5 million or 5% of the utility's gross revenue. The utility has the authority, when authorized by order of the Commission, to issue stocks and stock certificates or other securities payable at periods of more than 12 months for the following purposes: (1) the acquisition of property; (2) the construction, completion, extension, or improvement of its facilities; (3) the improvement or maintenance of its service; (4) the discharge or lawful refunding of its obligation; (5) the reimbursement of money actually expended for said purposes from income or any other money; or (6) any other purpose approved by the Commission. The utility must make application to the Commission for an order authorizing a proposed issue, assumption or guarantee of securities and the application of proceeds from the issuance for the purposes specified, by written petition. All securities issued, assumed, or guaranteed after July 1, 1961, without approval by the Commission, are void.

69-3-601 Provides for regulation of small power production facilities, which include all facilities that produce electricity by the use, as a primary source, of biomass, waste, water, wind,

or any combination thereof, produces electricity and thermal energy through cogeneration, has a power production capacity of not greater than 80 megawatts, and is owned by a person who is not primarily engaged in the generation or sale of electricity other than electric power from a small power production facility. Regulates the generation and sale of electricity by small power production facilities and requires that all sales be under the rates and conditions set by the Public Service Commission.

69-3-701 Authorizes utilities to purchase conservation or directly engage in conservation investments which have been approved by the Commission, with the cost-effective conservation measures to be, at the customer's discretion, installed by either a private firm, the customer himself, or the utility. Also authorizes the Commission to make on-site audits to insure compliance with the criteria set out in this section. Prohibits a utility which has placed the conservation in its rate base to claim a conservation tax credit.

69-4-101 Authorizes an electric light or electric power line corporation, or any person or public body owning or operating such an electric light or electric power line corporation, to install its plants and appliances which are necessary for service along any public roads, streets, or highways in the state. Any firm, agency, or person exercising the public right of way for utility lines and facilities, must install underground lines for electricity distribution in new service areas where it is technically and economically feasible.

69-4-201 Requires compliance with the National Electrical Safety Code standards in all future construction which involves wires for power, heat, light, telephone and telegraph. Also requires that electrical construction of overhead and underground electrical supply and communication lines in Montana be in conformity with the rules set forth in the National Electrical Safety Code, approved by the American National Standards Institute, as published by the Institute of Electrical and Electronic Engineers. The standards imposed by the National Electric Safety Code are to be enforced by the Public Service Commission. This section also states that all violations of this section are considered misdemeanors.

69-4-301 The "Underground Conversion of Utilities Law"; provides a procedure through which conversion of existing overhead electric and communications facilities to underground locations can be accomplished through the creation of special improvement districts. This section does not include within its definition of electric facilities those which are used or intended to be used for transmission of electric energy at nominal voltages in excess of 25,000 volts. This section authorizes the governing body of every county to create special improvement districts within the unincorporated portions of those counties and also authorizes the governing body of every city and town to create special improvement districts within its territorial boundaries. Requires the public utility to submit a cost and feasibility report to the Commission and to make a determination of conversion costs. Also imposes certain notice and hearing requirements prior to the passage of a resolution of intent to create such a district.

69-4-401 Establishes a petition process through which an owner of agricultural land across which overhead utility lines have been constructed may make a request of the district court for an order for relocation of the line for the purpose of installing an agricultural improvement; the cost of the relocation is to be borne 50% by the utility and 50% by the landowner, unless the landowner fails to complete the agricultural improvement within 2 years from the date of the relocation, in which case the petitioner must reimburse the owner of the line for the entire cost of relocation.

69-4-501 Requires all persons who wish to excavate in any public street, alley, or right of way dedicated to public use, or utility easement, to obtain information about the possible location of an underground facility from every public utility, municipal corporation, or other person or entity having the right to install underground facilities in such an area. Also requires that all persons or entities having the right to install such facilities file with the county clerk and recorder the name and address, and telephone number of persons possessing the necessary information, with an exception for areas with one-call notification centers. This Part also has provisions which set forth liability for damages to underground facilities caused by excavations by persons who have either failed to obtain or receive the necessary

information or have failed to carry out the excavation in a careful and prudent manner.

69-7-101 Grants to municipalities the authority and power to regulate, establish and change rates, charges, and classifications imposed for municipal utility systems, as long as the rates, charges and classifications are reasonable and just and are not raised to yield more than a 12% increase in total annual revenues or, in the case of mandated federal and state capital improvements, the increase may not exceed the amount necessary to meet the requirements of bond indentures or loan agreements required to finance the local government's share of mandated improvements; all increases in excess of these amounts must be approved by the Public Service Commission. This Part also imposes notice and hearing requirements for municipal rate hearings.

Part 2
NON-STATUTORY REGULATORY CONCEPTS

INTRODUCTION

That which follows is a summary of some of the more significant non-statutory regulatory concepts which have been implemented by the Commission in carrying out its rate-making functions.

Interim Rate Relief - The Commission has frequently authorized interim rate increases in major rate cases, which in most recent cases have approximated the Commission's final rate awards. Interim rate hikes have usually been authorized by the Commission within two to four months after the date of filing. The Commission's interim rules state that a utility's rates be updated to reflect current economic realities while avoiding rates that may reflect controversial claims.

Return on Equity - The Commission has generally authorized below-industry-average returns on common equity. In a July 19, 1991 rate decision for Montana Power (MPCo), the Commission authorized a 12.1% equity return for both the electric and gas operations.

Rate Base and Test Period - The Commission relies on a 12-month average depreciated original cost rate base for a historical test period, adjusted for known and measurable changes. Test periods utilized by the Commission have generally been historical at filing and more than one year old by the time of final decision.

Accounting and CWIP - The Commission generally flows through those tax benefits not required to be normalized by law. The Commission generally does not permit construction work in progress (CWIP) to be included in rate base.

Integrated Resource Planning - In October 1990, the Commission opened a generic investigation into integrated resource planning (IRP). The Commission sought comments from "interested parties" on the merits of IRP and competitive resource acquisition, and recommendations as to the scope, policy and implementation of such programs. Guidelines that provide incentives for utility conservation efforts are also to be considered. In March 1991, the Commission issued for comment proposed guidelines which would: 1) require utilities to acquire marginal conservation measures at up to 115% of the price of avoided costs with recovery in rates; 2) begin competitive bidding programs for utilities to acquire 20-25 MW of power; and 3) allow utilities up to a 2% return premium for conservation expenditures. Hearings were held in October 1991 with final guidelines to be promulgated in early 1992.

Fuel Adjustment Clauses - Electric fuel adjustment clauses are not permitted in Montana; however, the state's electric utilities rely primarily on hydro and captive coal sources for generation. MDU and MPCo are permitted to use a tariff to track changes in the costs of purchased gas and other gas costs. The companies defer gas expenses which are in excess of, or less than, the costs recovered through current rate levels. These expenses are deferred until the discrepancy can be determined in a subsequent rate case. Over and under recoveries are reconciled on a six to twelve month basis.

Rate Structure - In August 1988, the Commission gave final approval for an electric economic incentive (EEI) rate proposed by MPCo for large industrial customers who use 5 MW or more of power. The EEI rate is designed to "provide electric services to Montana industry which, without the lower rate, would not be able to begin, or expand operations." The tariff does not contain a sunset date or termination provision. However, the MPCo contract stated that the EEI rate would be available "only for so long as MPCo determines that it has existing resources available to serve the additional load."

On October 3, 1991, the Commission approved a MPCo proposal to restructure its natural gas operations. Major non-core customers (other utilities and large industrial and commercial customers) are free to obtain their own natural gas supply, with MPCo to provide transportation services at Commission-regulated rates. Rates to core customers are to increase to the extent the Commission reallocates fixed costs, but less than would be the case if the non-core customers were to bypass the company's natural gas system. The plan anticipates redeployment or disposal of certain assets which would not be required to maintain reliable service to core customers.

Integrated Resource Planning - Recent PSC rulings allow the Department of Administration to work in conjunction with the Montana Power Company to improve energy conservation in the initial design of new construction projects. The Department of Administration is currently in the process of applying for $76 million from the Montana Power Company programs for assistance and for new construction projects.

Interruptible Gas Supply and Co-generation on College Campuses - The Department of Administration is currently analyzing and, where appropriate, integrating alternative fuel systems to natural gas systems to realize savings associated with interruptible rates. The Department has installed a co-generation fuel system at Montana State University and is currently researching the possibility of installing a similar co-generation fuel system at the University of Montana.

Recent Developments - In 1990, the Commission initiated an informal investigation into possible changes to the current regulatory framework in the state. MPCo filed

data showing that the state's electric and gas utilities have been largely unable to earn their authorized rates of return. A committee comprised of representatives from MPCo, MDU, USW, the Commission, and the Consumer Counsel was formed to examine regulatory reform issues. In December 1991, the Commission adopted new rules for electric and gas rate filings on an optional experimental basis. The new rules are to be effective through December 31, 2000. A utility that is filing for a general rate increase may elect to file subject to these rules any time within the next 24 months, with such election to be binding for a period of 71 months (roughly six years) after the date of filing. A utility opting to operate under the new rules would be required to submit biennial cost-of-service filings which are to: 1) take into account "changes known with certainty and measurable with reasonable accuracy prior to the Commission's hearing on the utility's application for increased rates" provided they do not occur more than 13 months from the close of the test year; 2) utilize a rate base "computed on an end of test year basis"; and 3) state known revenue changes on an annualized basis. Utilities proceeding under the new rules shall be permitted to make limited issue filings in the event that cost increases exceed 3% of the utility's allowed overall return in dollars. No return on equity adjustments would be permitted while operating under the new rules. Utilities may choose to operate under these experimental procedures as early as 1992.

COAL GROSS PROCEEDS TAX

(DOR's Notice to Operators; Edited)

Each person engaged in the mining of coal must, on or before March 31 each year, file a statement with the Department of Revenue of the gross yield from each coal mine owned or worked in the preceding calendar year. The value of the gross yield is an amount equal to the contract sales price (f.o.b. mine price less production taxes included by the producer in the sales price) or a price imputed by the Department of Revenue when the operator of the mine is using coal produced in an energy conversion, the operator sells the coal under a contract which is not an arm's-length agreement and the price is less than market value, or the operator neglects or refuses to file the requisite statement, plus any exempt revenue from production.

On or before July 1 each year, the Department will transmit to the assessor of the county in which the mine is located notice of the value of the gross yield for taxation. The assessor will levy a 5% tax against the value of the reported gross proceeds. The county treasurer will proceed to give full notice to each coal producer of the taxes due and to collect the taxes as provided. One-half of the tax is due on or before 5 o'clock p.m. on November 30, or within 30 days after the notice is postmarked, whichever is later, and one-half is due on or before 5 o'clock p.m. on May 31.

COAL MINE SEVERANCE TAX

(DOR's Notice to Operators; Edited)

As of June 30, 1991, a severance tax is imposed on each ton of coal produced in Montana in accordance with the following:

Heating quality BTUs per pound of coal)	Surface Mining	Underground Mining
Under 7,000	10% of value	3% of value
7,000 and over	15% of value	4% of value

The value of coal is derived from the contract sales price; which means either the price of coal extracted and prepared for shipment f.o.b. mine (excluding the amount charged to the seller as taxes on production), or a price imputed by the Department in the following situations:

(a) the operator of the coal mine refines the coal by using the produced coal in an energy-conversion or other manufacturing process;

(b) the operator of a coal mine refines the coal by drying, cleaning, or other processing designed to improve the quality of the coal;

(c) a person sells coal under a contract which is not an arm's-length agreement; or

(d) a person neglects or refuses to file a statement and tax return under the coal gross proceeds statutes and rules.

A person is not liable for any severance tax on 50,000 tons of coal produced in a calendar year, except that if production exceeds 50,000 tons the severance tax will be imposed upon all coal in excess of 20,000 tons.

The tax is due 30 days following the end of each quarter.

OIL AND GAS NET PROCEEDS TAX
(DOR's Notice to Operators)

A well must not have had any production during the five years immediately preceding the first month of qualified production; or began production after June 30, 1985.

A separate return must be filed for each lease. The operator of record at the end of the calendar quarter must report the entire quarter's sales.

Reporting Requirements for Oil and Gas Net Proceeds Tax:

FILING:	Quarterly
DUE DATE:	On or before last day of the months of October, January, April and July of each year
PAYMENT:	Tax billed and collected quarterly by county treasurer where property is located. PAYMENT SHOULD NOT BE MADE TO THE OFFICE OF THE DEPARTMENT OF REVENUE WITH FILINGS.
TAX RATE:	Oil - 7% of the total gross value Gas - 12% of the total gross value
EXEMPTION:	After notification to the Department, new production is exempt from tax for 12 months from date of first production.
FORMS:	Net Proceeds No. 10 (pink) Return and Statement of Net Proceeds For taxable net proceeds only Net Proceeds No. 10A (amber) New Exempt and Taxable Production Complete for each well even if you pay no tax for quarter Net Proceeds No. 8 (yellow) Schedule of Royalty Interests Set forth names, addresses, and amount paid or yielded as royalty every fourth quarter each year

STATE OIL SEVERANCE TAX, OIL PRIVILEGE AND LICENSE TAX, and OIL RESOURCE INDEMNITY TRUST TAX

(DOR's Notice to Operators; Edited)

Form 0-1 (white) is used to show the oil tax computation for all three taxes. Additional schedules available from DOR assist in determining taxable values for the Oil Severance Tax, Privilege and License Tax, and the Resource Indemnity Trust Tax.

Reporting Requirements for Oil Severance Tax:

FILING:	Quarterly
DUE DATE RETURN AND PAYMENT:	On or before 60th day following end of calendar year quarter
EXEMPTION:	Effective August 8, 1990, this exemption has been terminated. On this date, the governor certified that the price of West Texas intermediate crude oil reached $25 per barrel and that § 15-36-121, MCA, provided for the termination of this exemption for both oil and gas.
TAX RATE:	Regular production 5% (.05) (Lease or unit produces 10 barrels or more per day)

Montana Code Annotated, Title 15, Chapter 36, Section 121, defines a "stripper well" as being a well that produces less than 10 barrels of oil per day determined by dividing the amount of production from the lease or unitized area for the year prior to the current calendar year by the number of producing wells in the lease or unitized area, and dividing the resultant quotient by 365. Therefore, under this definition, an entire lease or unit either will qualify or will not qualify as stripper production. A lease or unit cannot have some wells being reported as stripper wells and other wells being reported as regular production.

Effective September 1, 1990, this tax incentive for stripper oil has been terminated on the State Oil Severance Tax. On this date, the governor certified that the price of West Texas intermediate crude oil reached $30 per barrel and that §§ 15-36-101 and 15-36-121, MCA, provided for the termination of this tax incentive.

FORMS: Form 0-1 (white)
Summary page for all three taxes

Form O-P (blue)
For production taxed at regular rate

Form Amended O-P (pink)
Use for amending prior quarter's returns

Reporting Requirements for Oil Privilege and License Tax:

FILING:	Quarterly
DUE DATE RETURN AND PAYMENT:	On or before 60th day following end of calendar year quarter
EXEMPTION:	None
TAX RATE:	.2% (.002)
FORMS:	Form 0-1 (white) Same form as oil severance tax See the Privilege and License Tax Computation section for instructions

Reporting Requirements for Oil Resource Indemnity Trust Tax:

FILING:	Annually
DUE DATE RETURN AND PAYMENT:	On or before 60th day following end of calendar year
EXEMPTION:	None
TAX RATE:	.5% (.005)
FORMS:	Form 0-1 (white) same form as oil severance tax See Resource Indemnity Trust Tax section for instructions

STATE GAS SEVERANCE TAX, GAS PRIVILEGE AND LICENSE TAX, and GAS RESOURCE INDEMNITY TRUST TAX

(DOR's Notice to Operators; Edited)

Form NG-1 (yellow) is used to show the gas tax computation for all three taxes. Additional schedules available from DOR assist in determining taxable values for the Gas Severance Tax, Privilege and License Tax, and the Resource Indemnity Trust Tax.

Reporting Requirements for Gas Severance Tax:

FILING:	Quarterly
DUE DATE RETURN AND PAYMENT:	On or before 60th day following end of calendar year quarter
EXEMPTION:	Effective August 8, 1990, this exemption has been terminated. On this date, the governor certified that the price of West Texas intermediate crude oil reached $25 per barrel and that § 15-36-121, MCA, provided for the termination of this exemption for both oil and gas.
TAX RATE:	Regular production 2.65% (.0265) (Lease or unit produces over 60 MCFs per day) Stripper production 1.59% (.0159) (Lease or unit produces 60 MCFs or less per day)

Montana Code Annotated, Title 15, Chapter 36, Section 121, defines a "stripper well" as being a well that produces 60,000 cubic feet of natural gas or less per day determined by dividing the amount of production from the lease or unitized area for the year prior to the current calendar year by the number of producing wells in the lease or unitized area, and dividing the resultant quotient by 365. Therefore, under this definition, an entire lease or unit either will qualify or will not qualify as stripper production. A lease or unit cannot have some wells being reported as stripper wells and other wells being reported as regular production.

If a well qualifies for the "stripper" category, the first 30 MCFs produced per day are exempt from tax. All MCFs produced above 30 MCFs per day are taxed at the "stripper" rate.

FORMS:	Form NG-1 (yellow) Summary page for all three taxes
	Form NG-P (yellow) For production taxed at regular rate
	Form NG-S (blue) For production taxed at stripper rate
	Form Amended NG-P (white) Use for amending prior quarter's returns

Reporting Requirements for Gas Privilege and License Tax:

FILING:	Quarterly
DUE DATE RETURN AND PAYMENT:	On or before 60th day following end of calendar year quarter
EXEMPTION:	None
TAX RATE:	.2% (.002)
FORMS:	Form NG-1 (yellow) same form as gas severance tax See the Privilege and License Tax Computation section for instructions

Reporting Requirements for Gas Resource Indemnity Trust Tax:

FILING:	Annually
DUE DATE RETURN AND PAYMENT:	On or before 60th day following end of calendar year
EXEMPTION:	None
TAX RATE:	.5% (.005)
FORMS:	Form NG-1 (yellow) same form as gas severance tax See Resource Indemnity Trust Tax section for instructions

LOCAL GOVERNMENT SEVERANCE TAX
(DOR's Notice to Operator)

L.G.S.T. production includes any well which began production before July 1, 1985.

Reporting Requirements for L.G.S.T.:

FILING:	Quarterly
DUE DATE:	On or before 60th day following end of calendar year quarter
PAYMENT:	The L.G.S.T. tax is paid in quarterly installments one year after the end of each quarter for which a statement is completed as required. PAYMENT SHOULD NOT BE MADE TO THE OFFICE OF THE DEPARTMENT OF REVENUE WITH FILINGS.
TAX RATE:	Oil: 5% of total gross value of incremental production from qualified tertiary recovery projects
	5% of the total gross value of all production from qualified "stripper" production
	8.4% of the total gross value of all other production
	12.5% on the gross value paid in cash or apportioned in kind to a nonworking interest owner by the operator or producer of extracted marketable petroleum and other mineral or crude oil
	Gas: 10% of the total gross value of all production from qualified "stripper" production
	15.25% of the total gross value of all other production
	15.25% on the gross value paid in cash or apportioned in kind to a nonworking interest owner by the operator or producer of extracted or marketable natural gas

Definition: "Nonworking interest owner" means any interest owner who does not share in the development and operation costs of the lease or unit.

EXEMPTION: None

FORMS:

LGST No. 1 (green)
Tax Return Page

LGST No. 2 (gold)
Regular Oil Production

LGST No. 2A (pink)
Stripper and Tertiary Oil Production

LGST No. 3 (blue)
Regular Gas Production

LGST No. 3A (yellow)
Gas Stripper Production

LGST No. 4 (white)
Stripper Production Calculation

LGST No. 5 (white)
Schedule of Royalty Interests

METAL MINES GROSS PROCEEDS

(DOR's Notice to Operators)

Each person engaged in mining or extracting gold, silver, copper, lead, or other metals from any mine or mining property within this state must, on or before March 31 each year, file with the Department of Revenue a statement of gross metal yield from each mine property owned or worked in the preceding calendar year. The gross metal yield is the revenue realized from the extraction of metals, which is determined by multiplying the quantity produced by the average of the exchange value of all property produced or extracted over a twelve-month period. After the Department determines the merchantable value of all metal production from the previous calendar year, it will transfer this value on or before July 1 to its agent in each county where metals have produced the merchantable value. The Department's agent will transmit a tax roll, from the reported valuation, to the county treasurer on or before September 15 each year. The county treasurer will then give full notice to each metal producer and collect the taxes due. One-half of the taxes are payable on or before 5 o'clock p.m. on November 30 each year, or within thirty days after the tax notice is postmarked, whichever is later, and one-half on or before 5 o'clock p.m. on May 31 each year.

METALLIFEROUS MINES LICENSE TAX

(DOR's Notice to Operators)

The annual license tax is to be paid by a person engaged in or carrying on the business of working or mining property in this state from which gold, silver, copper, lead, or any other metal or metals or precious or semiprecious gems or stones are produced, at the following rates:

(1) Concentrate shipped to a smelter, mill or reduction work is taxed the following rate:

Gross Value of Product	Rate of Tax (% of Gross Value)
First $250,000	0%
More than $250,000	1.81% of increment

(2) Gold, silver, or any platinum-group metal that is dore, bullion or matte and that is shipped to a refinery is taxed at the following rate:

Gross Value of Product	Rate of Tax (% of Gross Value)
First $250,000	0%
More than $250,000	1.6% of increment

The gross value of the product means the receipts realized from the extraction and sale of metals or concentrate containing metals. The receipts received is the monetary payment or refined metal received by the mining company from the metal trader, smelter, roaster, or refinery, determined by multiplying the quantity of metal received by the metal trader, etc., by the quoted price for the metal and then subtracting basic treatment and refinery charges, quantity deductions, price deductions, interest, and penalty metal, impurity, and moisture deductions as specified by contract. Deductions are not allowed either directly or indirectly for the cost of anything related to transportation form the mine or mill to the smelter, roaster, or refinery.

The return and tax due must be submitted to the Department by March 31.

RESOURCE INDEMNITY TRUST TAX

(DOR's Notice to Operators)

Any person, except if that person has paid the metalliferous mines tax, engaged in or carrying on the business of mining, extracting, or producing a mineral is assessed a $25 tax, plus an additional amount computed on gross value of the product that was derived from the business work or operation within this state at the rate of ½ of 1% of the amount of gross value at the time of extracting from the ground, which means after loading but before hauling, if in excess of $5,000. If mining, extracting, or producing talc, the rate would be 4% of the gross value. If mining, extracting, or producing vermiculite, the rate would be 2% of the gross value.

The tax due on coal is computed at the rate of 0.4% of the "contract sales price" as defined in the Coal Severance statutes (§ 15-35-102, Montana Code Annotated, effective for coal produced on or after January 1, 1992).

For all producers other than metal mines, the return and tax are due on or before March 1 on the value of product in the year preceding January 1, of the year in which the tax was paid. For metal producers, the returns are due on March 31.

Appendix H.

MONTANA ENERGY DATA HANDBOOK

December 1992

Prepared for

ENVIRONMENTAL QUALITY COUNCIL
Room 106, State Capitol
Helena, MT 59620-1704
(406) 444-3742

Prepared by

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
Energy Division
1520 East Sixth Avenue
Helena, MT 59620-2301
(406) 444-6697

BACKGROUND

House Joint Resolution 31 of the 1991 Legislature directed the Environmental Quality Council (EQC) to develop a framework for a proposed state energy policy. EQC requested that the Department of Natural Resources and Conservation (DNRC) compile available energy data to provide a context and a historical perspective to the development of the energy policy. DNRC produced the *Montana Energy Data Handbook*, an extensive update and revision of the *Montana Historical Energy Statistics*. This handbook also will support application of the EQC Energy Policy Analysis Methodology, developed as an element of the energy policy framework. That methodology is designed as a tool for evaluating the costs and benefits of energy-related legislation. To meet the deadlines imposed by the schedule of a legislative session, the methodology will rely heavily on data already gathered in the handbook.

ACKNOWLEDGMENTS

This report was compiled by Paul Cartwright (Production and Consumption, Petroleum Products, Renewable Energy, and Background Data), Bob Frantz (Coal, Natural Gas, and Crude Oil), Patricia Glick (Transportation), and John Goroski (Electricity). Nancy McLane assisted in data gathering and production for all sections. Barbara Lien did the layout and design. Pat Boggess, Joanne Brown, Kerry Campbell, and Emelia Satre handled the word processing. Paul Cartwright provided overall project coordination.

In addition, many individuals from private organizations, utilities, and government agencies provided data for this publication.

Contents

Figures

Notes Regarding the Data

The reader is cautioned against data comparisons between tables drawn from different sources. First, this report uses definitions developed by the U.S. Department of Energy (DOE) for the residential, commercial, industrial, transportation, and electricity utility end-use sectors. These sector definitions are not necessarily the same as those used by other data sources. Second, in some instances, two sources may show markedly different figures for basically the same data item. Such discrepancies are the result of differences in data collection methods and reporting procedures. This report recognizes that these differences exist but, in general, does not include explanations for the differences. Readers needing detailed explanations of the definitions, data collection methods, etc., should refer to the original data sources or contact the Energy Division.

Sales of energy products do not necessarily indicate consumption of those products. Some forms of energy may be added to storage facilities during the reporting period, causing sales to exceed consumption. Similarly, actual consumption may exceed sales if stockpiles are reduced by withdrawals from storage.

When DOE changes its reporting procedures or estimation methods, data from previous years are often revised to provide a time series of reasonably comparable data. For the purposes of this document, individual figures or years of data have been revised according to the most recently published information. In most cases, however, these revisions are not noted in the tables.

In some cases, individual data entries do not add to the printed totals. This can occur when the individual items have been rounded independently of the totals, or when the totals are based on unpublished revisions of the individual entries. (For example, many federal publications are published both monthly and annually, but the annual figures reflect unpublished additions, corrections, and revisions to the monthly data.) In such cases, the reader should consider the individual data entries indicative of the measurement in question rather than definitive.

DOE source publications often change the units in which data are reported; for example, DOE may change from reporting natural gas in millions of cubic feet to billions of cubic feet. Rather than revising the entire data series to reflect such a change, this report generally retains the original reporting units, appending zeros as necessary. For this reason, trailing zeros in figures should be considered place holders rather than significant digits.

The compilation of this publication was completed in November 1992. The most current data available at the time were used. Final energy data compiled by the U.S. Department of Energy typically are not published until 10-12 months after the end of the year.

Comments, corrections, suggestions, and requests for assistance as they apply to this report should be addressed to the Energy Division, Department of Natural Resources and Conservation, 1520 East Sixth Avenue, Helena, Montana 59620; telephone (406) 444-6697.

Abbreviations and Acronyms

bbl	Barrel
bcf	Billion cubic feet
Btu	British thermal unit
CAFE	Corporate Average Fuel Economy
CPI	Consumer Price Index
DNRC	Montana Department of Natural Resources and Conservation
DOE	U.S. Department of Energy
DOR	Montana Department of Revenue
DRB	Demonstrated reserve base
E	Estimated figure
EIA	U.S. Department of Energy, Energy Information Administration
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
GVW	Gross vehicle weight
GW	Gigawatt
GWh	Gigawatt-hour
HDD	Heating degree day
kW	Kilowatt
kWh	Kilowatt-hour
LPG	Liquefied petroleum gas
mcf	Thousand cubic feet
Mbbl	Thousand barrels
MMbbl	Million barrels
MMcf	Million cubic feet
MPC	Montana Power Company
Mtons	Thousand short tons
MW	Megawatt
MWh	Megawatt-hour
NA	Not available
P	Preliminary figure
PSC	Montana Public Service Commission
psia	Pounds per square inch absolute
QF	Qualifying facility
t	(Short) ton
TBtu	Trillion British thermal units
w	Withheld to avoid disclosure of individual company data
W	Watt

Glossary

Asphalt: A dark-brown-to-black cement-like material containing bitumens as the predominant constituents obtained by petroleum processing. The definition includes crude asphalt as well as the following finished products: cements, fluxes, the asphalt content of emulsions (exclusive of water), and petroleum distillates blended with asphalt to make cutback asphalts.

Average Megawatt: A unit of energy output over a specified time period. It is equivalent to the total energy in megawatt-hours divided by 8,760 (the number of hours in a year).

Average Mine Price: The total value of the coal produced at the mine divided by the total production tonnage (See **F.O.B. Mine Price**).

Aviation Gasoline: All special grades of gasoline for use in aviation reciprocating engines, as given in ASTM Specification D910 and Military Specification MIL-G-5572. Aviation gasoline includes blending components.

Barrel: A volumetric unit of measure for crude oil and petroleum products equivalent to 42 U.S. gallons.

Bcf: One billion cubic feet.

British Thermal Unit (Btu): A standard unit of energy equal to the quantity of heat required to raise the temperature of 1 pound of water by 1 degree Fahrenheit (F).

Capacity: The amount of electric power which a generator, turbine, transformer, transmission circuit, station, or system is capable of producing or delivering.

Class of Service: A group of customers with similar characteristics (e.g., residential, commercial, industrial, sales for resale, etc.) identified for the purpose of setting an electric rate structure.

Coal: A black or brownish-black solid combustible substance formed by the partial decomposition of vegetable matter without free access to air and under the influence of moisture and, often, increased pressure and temperature. The rank of coal (anthracite, bituminous, subbituminous, and lignite) is determined by its heating value.

Anthracite: Hard and jet black with a high luster, it is the highest rank of coal and is mined in northeastern Pennsylvania. Anthracite contains approximately 22 to 28 million Btu per ton as received.

Bituminous: The most common coal, it is soft, dense, and black with well defined bands of bright and dull material. Bituminous is ranked between anthracite and subbituminous and is mined chiefly in Kentucky, Pennsylvania, and West Virginia. The heating value ranges from 19 to 30 million Btu per ton as received.

Lignite: A brownish-black coal of the lowest rank; it is mined in North Dakota, **Montana**, and Texas. The heat content of lignite ranges from 9-17 million Btu per ton as received.

Subbituminous: A dull black coal ranking between lignite and bituminous; it is mined chiefly in **Montana** and Wyoming. The heat content of subbituminous coal ranges from 16 to 24 million Btu per ton as received.

Coal Rank: A classification of coal based on fixed carbon, volatile matter, and heating value.

Cogeneration: A process that sequentially produces useful energy (thermal or mechanical) and electricity from the same energy sources.

Consumer Price Index (CPI): This index is issued by the U.S. Department of Labor, Bureau of Labor Statistics as a measure of average changes in the retail prices of goods and services.

Corporate Average Fuel Economy (CAFE): The Energy Policy and Conservation Act of 1975 requires car manufacturers to meet strict energy efficiency standards. In 1991, the range of new cars sold by each manufacturer is required to obtain an average of 27.5 mpg and light trucks 20.7 mpg.

Crude Oil (Including Lease Condensate): A mixture of hydrocarbons that exists in liquid phase in underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities. Included are lease condensate and liquid hydrocarbons produced from tar sands, gilsonite, and oil shale. Drip gases are also included, but topped crude oil (residual oil) and other unfinished oils are excluded. Where identifiable, liquids produced at natural gas processing plants and mixed with crude oil are likewise excluded.

Demand: The rate at which electric energy is delivered to a system, part of a system, or piece of equipment at a given instant or during a designated period of time (See **Load**).

Demand-Side Management: Electric utility activities designed to reduce customer use of electricity or change the time pattern of use in ways that will produce desired changes in the utility load.

Demonstrated Reserve Base: A collective term for the sum of coal in both measured and indicated resource categories of reliability that represents 100 percent of the coal in these categories in place as of a certain date. Includes beds of bituminous coal and anthracite 28 or more inches thick and beds of subbituminous coal 60 or more inches thick that occur at depths to 1,000 feet. Includes beds of lignite 60 or more inches thick that can be surface mined. Includes also thinner and/or deeper beds that presently are being mined or for which there is evidence that they could be mined commercially at this time. Represents that portion of the identified coal resource from which reserves are calculated.

Diesel Fuel: Fuel used for internal combustion in diesel engines; usually that fraction of crude oil that distills after kerosene (See **Distillate Fuel Oil**).

Direct Normal Radiation: Solar beam radiation coming from the sun's disk (measured by a pyrheliometer). As used in this publication, the average daily sum of direct normal solar radiation.

Distillate Fuel Oil: A general classification for one of the petroleum fractions produced in conventional distillation operations. It is used primarily for space heating, on-and-off-highway diesel engine fuel (including railroad engine fuel and fuel for agricultural machinery), and electric power generation. Included are products known as No. 1, No. 2 and No. 4 fuel oils; No. 1, No. 2, and No. 4 diesel fuel.

End-Use Sectors: Energy use is assigned to the major end-use sectors according to the following guidelines as closely as possible:

Residential sector: Energy consumed by private household establishments primarily for space heating, water heating, air conditioning, cooking, and clothes drying.

Commercial sector: Energy consumed by non-manufacturing business establishments, including motels, restaurants, wholesale businesses, retail stores, laundries, and other service enterprises; by health, social, and educational institutions; and by federal, state, and local governments.

Industrial sector: Energy consumed by manufacturing, construction, mining, agriculture, fishing, and forestry establishments.

Transportation sector: Energy consumed to move people and commodities in both the public and private sectors, including military, railroad, vessel bunkering, and marine uses, as well as the pipeline transmission of natural gas.

Electric utility sector: Energy consumed by privately and publicly owned establishments that generate electricity primarily for resale.

Ethanol: Ethyl alcohol or grain alcohol, C_2H_5OH. It is the alcohol contained in intoxicating beverages. Ethanol can be produced from biomass by the conversion process called fermentation (See **Gasohol**).

F.O.B. Mine Price: The "free on board" mine price. This is the price paid for coal measured in dollars per short ton at the mining operation site and, therefore, does not include freight/shipping and insurance costs.

Fossil Fuel: Any naturally occurring fuel of an organic nature, such as coal, crude oil, and natural gas.

Fuel: Any substance that, for the purpose of producing energy, can be burned, otherwise chemically combined, or split or fused in a nuclear reaction.

Gas Condensate Well: A gas well that produces from a gas reservoir containing considerable quantities of liquid hydrocarbons in the pentanes and heavier range generally described as "condensate."

Gas Well: A well that is completed for the production of gas from either nonassociated gas reservoirs or associated gas and oil reservoirs.

Gasohol: A blend of finished motor gasoline (leaded or unleaded) and alcohol (generally ethanol but sometimes methanol) in which 10 percent or more of the product is alcohol.

Generation (Electric): The production of electric energy from other forms of energy; also, the amount of electric energy produced, expressed in kilowatt-hours (kWh).

Gross: The total amount of electric energy produced by the generating units in a generating station or stations, measured at the generator terminals.

Net: Gross generation less the electric energy consumed at the generating station for station use. (Energy required for pumping at pumped-storage plants is regarded as plant use and is subtracted from the gross generation and from hydroelectric generation.)

Gigawatt (GW): One billion watts.

Gigawatt-hour (GWh): One billion watt-hours.

Global Radiation: The sum of the direct, diffuse, and ground reflected solar radiation components incident on a flat surface of any orientation.

Gross Withdrawals: Full well stream volume excluding condensate separated at the lease.

Heating Degree Days: The number of degrees per day the daily average temperature is below a certain temperature, usually 65 degrees Fahrenheit. The daily average temperature is the mean of the maximum and minimum temperature for a 24-hour period.

Horsepower: A unit of power equal to 746 watts.

Hydroelectric Power Plant: A plant in which the turbine generators are driven by falling water.

Implicit Price Deflator: A measure over time of price changes of goods and services. Unlike the Consumer Price Index, it is not based on surveys of the cost of a theoretical "market basket" of items, but rather is derived from data collected for the National Income Accounts. For this reason, it reflects price changes in actual current patterns of production and consumption.

Jet Fuel: The term includes kerosene-type jet fuel and naphtha-type jet fuel. Kerosene-type jet fuel is a kerosene-quality product used primarily for commercial turbojet and turboprop aircraft engines. Naphtha-jet fuel is a fuel in the heavy naphtha range used primarily for military turbojet and turboprop aircraft engines.

Kerosene: A petroleum distillate that boils at a temperature between 300-550 degrees F, that has a flash point higher than 100 degrees F, that has a gravity range from 40-46 degrees API, and that has a burning point in the range of 150-175 degrees F. Kerosene is used in space heaters, cook stoves, and water heaters, and is suitable for use as an illuminant when burned in wick lamps.

Kilowatt (kW): One thousand watts. The kW is the basic unit of measurement of electric power.

Kilowatt-hour (kWh): One thousand watt-hours. The kWh is the basic unit of measurement of electric energy, and is equivalent to 3412 Btu.

Lease Condensate: A natural gas liquid recovered from gas well gas (associated and nonassociated) in lease separators or natural gas field facilities. Lease condensate consists primarily of pentanes and heavier hydrocarbons.

Liquefied Petroleum Gases (LPG): Propane, propylene, butanes, butylene, butane-propane mixtures, ethane-propane mixtures, and isobutane produced at refineries or natural gas processing plants, including plants that fractionate raw natural gas plant liquids.

Load (Electric): The amount of electric power required by equipment in use at a given time at any specific point or points on a system.

Lubricants: Substances used to reduce friction between bearing surfaces or as process materials either incorporated into other materials used as processing aids in the manufacturing of other products or as carriers of other materials. Petroleum lubricants may be produced either from distillates or residues. Other substances may be added to impart or improve certain required properties. Excluded are byproducts of lubricating oil refining, such as aromatic extracts derived from solvent extraction or tars derived from deasphalting. Included are all grades of lubricating oils from spindle oil to cylinder oil and those used in greases. Lubricants categories are paraffinic and naphthenic.

Marketed Production: Gross withdrawals less gas used for repressuring, quantities vented and flared, and nonhydrocarbon gases removed in treating or processing operations.

Mcf: One thousand cubic feet.

Megawatt (MW): One million watts.

Megawatt-hour (MWh): One million watt-hours.

Motor Gasoline: A complex mixture of relatively volatile hydrocarbons, with or without small quantities of additives, obtained by blending appropriate refinery streams to form a fuel suitable for use in spark-ignition engines. Motor gasoline includes both leaded and unleaded grades of finished motor gasoline, blending components, and gasohol.

MMcf: One million cubic feet.

Nameplate Capacity: The capacity as shown on the manufacturer's identification plate. This appears on apparatus, such as generating units, turbines, or other equipment in a station or system. Installed station capacity does not include auxiliary or house units. The nameplate capacity is the full-load continuous rating of a generator, prime mover, or other electrical equipment under specified conditions as designated by the manufacturer. It is usually indicated on a nameplate attached mechanically to the equipment. Because manufacturers have differing standards of conservatism, there may be no fixed relationship between "nameplate capacity" and maximum sustainable capacity.

Natural Gas: A mixture of hydrocarbon compounds and small quantities of various nonhydrocarbons existing in the gaseous phase or in solution with crude oil in natural underground reservoirs at reservoir conditions. The principal hydrocarbons usually contained in the mixture are methane, ethane, propane, butane, and pentanes. Typical nonhydrocarbon

gases that may be present in reservoir natural gas are carbon dioxide, helium, hydrogen sulfide, and nitrogen. Under reservoir conditions, natural gas and the liquefiable portions occur either in a single gaseous phase in the reservoir or in solution with crude oil, and are not distinguishable at the time as separate substances.

Natural Gas—Associated-Dissolved: The combined volume of natural gas that occurs in crude oil reservoirs either as free gas (associated) or as gas in solution with crude oil (dissolved).

Natural Gas—Dry: The actual or calculated volumes of natural gas that remain after the liquefiable hydrocarbon portion has been removed from the gas stream (e.g., gas after lease, field, and/or plant separation), and any volumes of nonhydrocarbon gases have been removed where they occur in sufficient quantity to render the gas unmarketable.

Natural Gas—Nonassociated: Natural gas not in contact with significant quantities of crude oil in a reservoir.

Natural Gas—Wet After Lease Separation: The volume of natural gas remaining after removal of lease condensate in lease and/or field separation facilities, if any, and after exclusion of nonhydro–carbon gases where they occur in sufficient quantity to render the gas unmarketable. Natural gas liquids may be recovered from volumes of natural gas, wet after lease separation, at natural gas processing plants.

Natural Gas Liquids: Those hydrocarbons in natural gas that are separated from the gas through the processes of absorption, condensation, adsorption, or other methods in gas processing or cycling plants. Generally, such liquids consist of propane and heavier hydrocarbons and are commonly referred to as condensate, natural gasoline, or liquefied petroleum gases. Where hydrocarbon components lighter than propane are recovered as liquids, these components are included with natural gas liquids.

Nominal Dollars: Dollars that measure prices that have not been adjusted for the effects of inflation. Nominal dollars reflect the prices paid for products or services at the time of the transaction.

Petroleum: A generic term applied to oil and oil products in all forms, such as crude oil, lease condensate, unfinished oil, refined petroleum products, natural gas plant liquids, and nonhydrocarbon compounds blended into finished petroleum products.

Petroleum Products: Petroleum products are obtained from the processing of crude oil (including lease condensate), natural gas, and other hydrocarbon compounds. Petroleum products include unfinished oils, natural gasoline and isopentane, plant condensate, unfractionated stream, liquefied petroleum gases, aviation gasoline, motor gasoline, naphtha-type jet fuel, kerosene-type jet fuel, kerosene, distillate fuel oil, residual fuel oil, naphtha less than 400° F end-point, other oils over 400° F end-point, special naphthas, lubricants, waxes, petroleum coke, asphalt, road oil, still gas, and miscellaneous products.

Proved Reserves of Crude Oil: Proved reserves of crude oil, as of December 31 of the report year, are the estimated quantities of all liquids defined as crude oil that geological and engineering data show with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions.

Reservoirs are considered proved if economic producibility is supported by actual production or conclusive formation test (drill stem or wire line), or if economic producibility is supported by core analyses and/or electric or other log interpretations.

Proved Reserves of Natural Gas: Proved reserves of natural gas, as of December 31 of the report year, are the estimated quantities that analysis of geologic and engineering data show with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions.

Reservoirs are considered proved if economic producibility is supported by actual production or conclusive formation test (drill stem or wire line), or if economic producibility is supported by core analyses and/or electric or other log interpretations.

Proved Reserves of Natural Gas Liquids: Proved reserves of natural gas liquids, as of December 31 of the report year, are those volumes of natural gas liquids (including lease condensate) that with reasonable certainty have been shown to be separable in the future from proved natural gas reserves under existing economic and operating conditions.

PURPA: Public Utility Regulatory Policies Act of 1978. This act first required utilities to buy power from qualifying independent power producers.

Qualifying Facilities: Small power producers or cogenerators that meet the Federal Energy Regulatory Commission's or the Montana Public Service Commission's size, fuel source, and operational criteria as authorized by PURPA.

Real Dollars: Dollars that measure prices that have been adjusted for the effects of inflation, using an index such as the Implicit Price Deflator (See **Implicit Price Deflator**).

Recoverable Reserves: The amount of coal that can be recovered (mined) from the coal deposits at active, producing mines as of the end of the year.

Renewable Energy: Energy obtained from sources that are essentially sustainable (unlike, for example, the fossil fuels, of which there is a finite supply). Renewable sources of energy include wood, waste, solar radiation, falling water, wind, and geothermal heat.

Residual Fuel Oil: The topped crude of refinery operation that includes No. 5 and No. 6 fuel oils, Navy Special fuel oil, and Bunker C fuel oil. Residual fuel oil is used for the production of electric power, space heating, vessel bunkering, and various industrial purposes. Includes imported crude oil to be burned as a fuel.

Road Oil: Any heavy petroleum oil, including residual asphaltic oil, used as a dust palliative and surface treatment on roads and highways. It is generally produced in six grades, from 0, the most liquid, to 5, the most viscous.

Short Ton: A unit of weight equal to 2,000 pounds. All tonnages used in this publication are in short tons.

Steam-Electric (Conventional) Plant: A plant in which the prime mover is a steam turbine. The steam used to drive the turbine is produced in a boiler by heat from burning fossil fuels (See **Fossil Fuel** and **Fuel**).

Surface Mine: A mine producing coal that is usually within a few hundred feet of the earth's surface. Overburden (earth above or around the coal) is removed to expose the coal bed. The bed is then mined using surface excavation equipment such as draglines, power shovels, bulldozers, loaders, and augers.

Underground Mine: A mine tunneling into the earth to the coal bed. Underground mines are classified according to the type of opening used to reach the coal—i.e. drift (level tunnel), slope (inclined tunnel), or shaft (vertical tunnel).

Watt: The electrical unit of power or rate of doing work. A watt is the rate of energy transfer equivalent to 1 ampere flowing under pressure of 1 volt at unity power factor (volt and ampere in phase). It is analogous to horsepower or foot-pound-per-minute of mechanical power. One horsepower is equivalent to approximately 746 watts.

Chapter 1: Energy Production and Consumption

The data collected here deal with Montana. Nonetheless, it is important to remember that Montana is an integral part of a wider energy system. Much of Montana oil, natural gas, and electricity production is exported out of state, while much of the consumption actually is of fuels imported into the state. A full understanding of Montana's energy situation requires not just the data presented here, but also an appreciation of these interstate and international connections.

Production

Montana produces coal, natural gas, and crude oil fuels. These are used directly or are converted to other forms of energy. The 1991 production of these fuels, plus electricity from hydroelectric dams and from plants that burn wood, was equivalent to 890 trillion British thermal units (Btu) of energy. This is down from a high of 915 trillion Btu in 1988, but still 2 percent higher than 1990. For comparison, Montana's 1990 production was a little over 1 percent of the United States' 81,151 trillion Btu consumption in the same year.

Coal is the source of most of the energy produced in Montana. In 1991, three-quarters of the energy produced in Montana was in the form of coal. Over the past decade, coal production increased from 28 million tons in 1982 to almost 39 million tons in 1988, before sliding back slightly to less than 38 million tons in 1991. That year, around 90 percent of the coal mined was exported, either by rail or by transmission line after conversion to electricity.

Montana also produces significant amounts of crude oil, natural gas and hydroelectricity. Crude oil has declined since the peak year of 1968, reaching a thirty year low in 1991 of 19.6 million barrels, 40 percent below peak. Natural gas production has been more varied, but over the past decade has stayed around 51 million cubic feet. Hydroelectric production varies from year to year, depending on the amount of precipitation. Since Libby Dam, the last big dam, was completed in 1975, production has varied between 8,500 million kWh and 12,400 million kWh. Production in 1991 was 11,900 million kWh.

Consumption

The industrial and the transportation sectors have long been the largest consumers of energy in Montana. In 1990, the industrial sector purchased 41 percent of the total energy sold in Montana, the transportation sector 34 percent, residential 14 percent, and commercial 11 percent.

Industrial consumption climbed until the end of the 1970s, then dropped as the Montana economy was restructured. The winding down of Anaconda Company operations in Montana a decade ago was particularly significant. Transportation energy use peaked in 1979, the year of the Iran crisis, then declined, and has remained more or less stable in recent years. Residential use has not changed much in the last ten years. By 1990, it still was less than during the 1970s, in spite of modest growth in population and economic activity. The same generally was true of the commercial sector.

In very broad terms, the residential and the commercial sector rely primarily on natural gas and electricity. The industrial sector relies on petroleum and electricity. The transportation sector uses petroleum almost exclusively.

Table 1.1. Production of Energy by Type of Fuel, 1960-91 (physical units)

Year	Subbituminous Coal (thousand short tons)	Lignite Coal (thousand short tons)	Natural Gas (million cubic feet)	Crude Oil (thousand barrels)	Hydroelectric Power (million kWh)	Wood and Waste Wood[1] (million kWh)
1960	113	200	33,235	30,240	5,801	NA
1961	97	274	33,716	30,906	6,499	0
1962	78	304	29,791	31,648	6,410	0
1963	53	290	29,862	30,870	6,011	0
1964	46	300	25,050	30,647	6,821	31
1965	63	301	28,105	32,778	8,389	37
1966	91	328	30,685	35,380	7,940	38
1967	65	300	25,866	34,959	8,703	56
1968	189	330	19,313	48,460	8,925	74
1969	722	308	41,229	43,954	9,447	61
1970	3,124	323	42,705	37,879	8,745	73
1971	6,737	327	32,720	34,599	9,595	60
1972	7,899	322	33,474	33,904	9,444	50
1973	10,411	314	56,175	34,620	7,517	48
1974	13,775	331	54,873	34,554	9,726	16
1975	21,620	520	40,734	32,844	9,560	14
1976	25,919	312	42,563	32,814	12,406	37
1977	27,091	302	46,819	32,680	8,460	46
1978	26,390	289	46,522	30,467	11,708	52
1979	32,149	305	53,888	29,957	10,344	52
1980	29,675	306	51,867	29,584	9,966	17
1981	33,127	204	56,565	30,813	11,323	34
1982	27,667	178	56,517	30,917	10,920	28
1983	28,454	207	51,967	29,665	11,561	39
1984	32,817	237	51,474	30,080	11,112	57
1985	32,928	213	52,494	29,934	10,175	60
1986	33,490	253	46,592	27,165	10,857	61
1987	34,087	290	46,456	25,104	8,925	49
1988	38,693	228	51,654	23,317	8,237	55
1989	37,477	295	51,307	20,969	9,550	72
1990	37,221	234	50,429	19,835	10,672	75
1991	37,747	283	51,999	19,573	11,921[P]	62[P]

[P] Preliminary

[1] Used to generate electricity.

NOTE: Because data on some fuels from renewable sources are not available, total production of energy is understated.

SOURCES: Coal: U.S. Bureau of Mines (1960-76); Montana Energy Office (1977); Table 3.4 (1978-91).
Hydroelectric Power and Wood and Waste: Table 2.4 (1960-91).
Natural Gas: Table 4.3, Federal Statistics, Marketed Production (1960-91).
Crude Oil: Table 5.5, DNRC Statistics (1960-91).

Table 1.2. Production of Energy by Type of Fuel, 1960-91 (trillion Btu)

Year	Subbituminous Coal	Lignite Coal	Coal Subtotal	Natural Gas	Crude Oil	Hydroelectric Power	Wood and Waste Wood	TOTAL
1960	2.0	2.6	4.7	33.7	175.4	19.8	0.0	**233.5**
1961	1.7	3.6	5.3	34.2	179.3	22.2	0.0	**241.0**
1962	1.4	4.0	5.4	30.2	183.6	21.9	0.0	**241.0**
1963	1.0	3.8	4.8	30.3	179.0	20.5	0.0	**234.6**
1964	0.8	3.9	4.8	25.4	177.8	23.3	0.1	**231.3**
1965	1.1	3.9	5.1	28.5	190.1	28.6	0.1	**252.4**
1966	1.6	4.3	5.9	31.1	205.2	27.1	0.1	**269.5**
1967	1.2	3.9	5.1	26.2	202.8	29.7	0.2	**264.0**
1968	3.4	4.3	7.7	19.6	281.1	30.5	0.3	**339.1**
1969	13.0	4.0	17.0	41.8	254.9	32.2	0.2	**346.2**
1970	56.2	4.2	60.5	43.3	219.7	29.8	0.2	**353.6**
1971	121.3	4.3	125.5	33.2	200.7	32.7	0.2	**392.3**
1972	142.2	4.2	146.4	33.9	196.6	32.2	0.2	**409.4**
1973	187.4	4.1	191.5	57.0	200.8	25.6	0.2	**475.1**
1974	248.0	4.3	252.3	55.6	200.4	33.2	0.1	**541.6**
1975	389.2	6.8	396.0	41.3	190.5	32.6	0.0	**660.4**
1976	466.5	4.1	470.6	43.2	190.3	42.3	0.1	**746.6**
1977	487.6	4.0	491.6	47.5	189.5	28.9	0.2	**757.6**
1978	475.0	3.8	478.8	47.2	176.7	39.9	0.2	**742.8**
1979	578.7	4.0	582.7	54.6	173.8	35.3	0.2	**846.5**
1980	534.1	4.0	538.2	52.6	171.6	34.0	0.1	**796.4**
1981	596.3	2.7	599.0	57.4	178.7	38.6	0.1	**873.8**
1982	498.0	2.3	500.3	57.3	179.3	37.3	0.1	**774.3**
1983	512.2	2.7	514.9	52.7	172.1	39.4	0.1	**779.2**
1984	590.7	3.1	593.8	52.2	174.5	37.9	0.2	**858.6**
1985	592.7	2.8	595.5	53.2	173.6	34.7	0.2	**857.3**
1986	602.8	3.3	606.1	47.2	157.6	37.0	0.2	**848.2**
1987	613.6	3.8	617.4	47.1	145.6	30.5	0.2	**840.7**
1988	696.5	3.0	699.5	52.4	135.2	28.1	0.2	**915.4**
1989	674.6	3.9	678.5	52.0	121.6	32.6	0.2	**884.9**
1990	670.0	3.1	673.0	51.1	115.0	36.4	0.3	**875.9**
1991	679.4	3.7	683.2	52.7	113.5	40.7[P]	0.2[P]	**890.3**[P]

[P] Preliminary

NOTE: The following factors were used to convert physical units to energy:

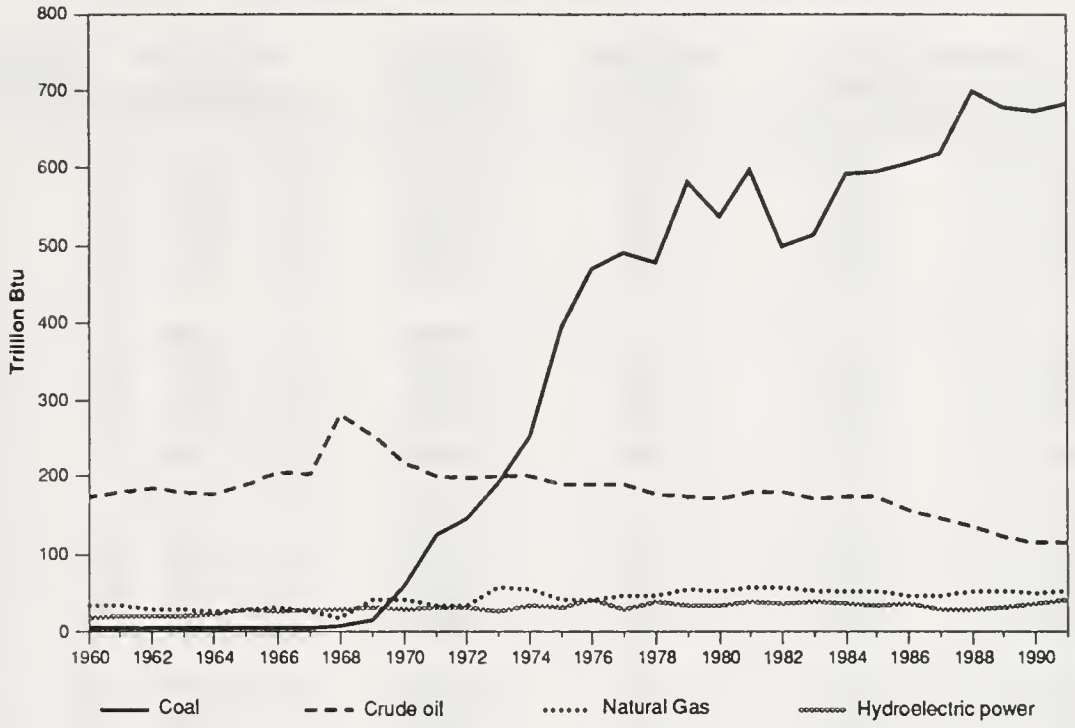
Subbituminous coal	—	9,000 Btu per pound, or 18,000,000 Btu per short ton
Lignite	—	6,550 Btu per pound, or 13,100,000 Btu per short ton
Natural gas	—	1,014 Btu per cubic foot
Crude oil	—	5,800,000 Btu per barrel
Electricity	—	3,412 Btu per kilowatt-hour

SOURCES: Production totals: Table 1.1

Conversion factors: U.S. Department of Energy, Energy Information Administration, *Cost and Quality of Fuels for Electric Utility Plants* (1987-91), DOE/EIA-0191 (for subbituminous coal and lignite, average 1987-91).

U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates*, DOE/EIA-0214(90) (for natural gas [average 1960-90] and crude oil).

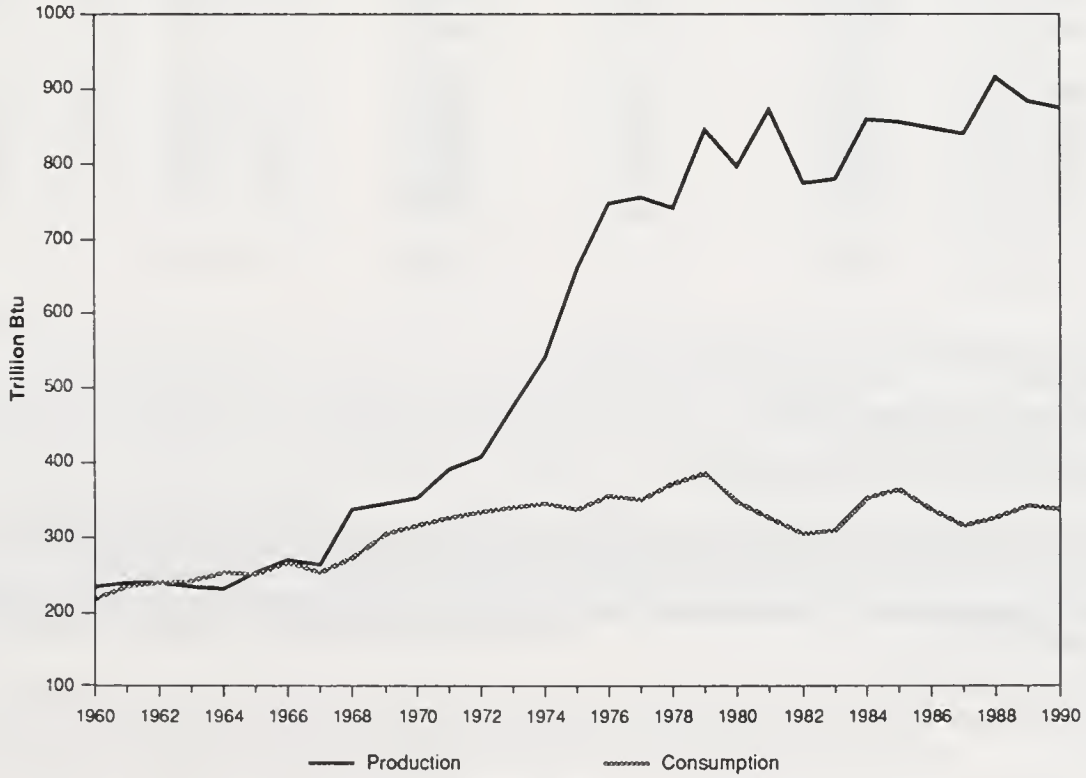
Figure 1.1. Production of Energy by Type of Fuel, 1960-91



NOTE: Wood and waste products used to generate electricity at electric utilities are not shown because their contribution is negligible.

SOURCE: Table 1.2.

Figure 1.2. Production and Consumption of Energy, 1960-90



NOTE: The difference between production and consumption is net exports plus associated conversion and transmission losses.

SOURCES: Production: Table 1.2.
Consumption: Table 1.4.

Table 1.3. Consumption of Energy by Type of Fuel, 1960-90 (physical units)

Year	Coal[1] (thousand short tons)	Natural Gas[2] (billion cubic feet)	Petroleum (thousand barrels)	Hydroelectric[1] Power (million kWh)	Wood and Waste Wood[1,3] (million kWh)
1960	254	56	19,028	5,800	0
1961	336	59	20,771	6,498	0
1962	373	63	21,127	6,409	0
1963	357	67	21,269	6,011	0
1964	381	69	21,590	6,819	31
1965	370	71	19,505	8,388	37
1966	392	72	20,897	7,939	39
1967	381	65	19,990	8,704	56
1968	450	63	22,201	8,924	74
1969	619	78	23,069	9,448	61
1970	763	88	22,452	8,744	73
1971	731	88	23,679	9,593	61
1972	830	84	26,009	9,443	51
1973	951	90	27,809	7,518	48
1974	923	80	28,079	9,723	16
1975	1,149	80	27,325	10,164	14
1976	2,507	74	29,667	12,400	37
1977	3,385	71	29,072	8,458	46
1978	3,390	73	30,787	11,706	52
1979	3,686	70	32,743	10,342	52
1980	3,520	61	29,110	9,963	17
1981	3,622	52	25,783	11,321	34
1982	2,826	52	23,661	10,918	28
1983	2,533	46	26,741	11,559	39
1984	5,283	47	26,614	11,110	57
1985	5,713	47	28,258	10,244	60
1986	7,780	41	24,575	10,855	61
1987	7,730	39	24,620	8,951	49
1988	10,634	42	24,932	8,240	55
1989	10,458	46	26,663	9,565	72
1990	9,676	43	26,580	10,718	75

[1] Includes consumption for generating electricity for export.

[2] Includes supplemental gaseous fuels.

[3] Consumed at utilities to produce electricity.

NOTE: Due to the lack of consistent historical data, statistics exclude wood, waste, geothermal, wind, photovoltaic, and solar thermal energy (except for small amounts used by electric utilities to generate electricity for distribution).

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates;1960-90* (EIA-0214).

Table 1.4. Consumption of Energy by Type of Fuel, 1960-90 (trillion Btu)

Year	Coal	Natural Gas[1]	Petroleum	Hydroelectric Power[2]	Wood and Waste Wood[3]	Net Interstate Flow of Electricity with Losses[2,4]	TOTAL In-state Consumption
1960	4.0	57.6	106.6	62.4	0.0	-10.9	**219.8**
1961	5.1	61.3	116.4	69.2	0.0	-18.0	**234.1**
1962	5.7	65.7	119.2	67.7	0.0	-18.0	**240.2**
1963	5.4	66.6	120.2	63.0	0.0	-11.1	**244.1**
1964	5.8	69.5	122.0	71.3	0.3	-14.1	**254.9**
1965	5.5	70.8	109.0	87.7	0.4	-23.7	**249.7**
1966	5.8	72.1	116.8	82.7	0.4	-10.8	267.0
1967	5.5	64.9	110.3	90.8	0.6	-19.7	**252.3**
1968	6.7	62.8	123.0	92.8	0.8	-14.1	**272.0**
1969	9.6	78.2	128.0	98.7	0.6	-8.7	**306.5**
1970	12.0	90.6	124.8	91.8	0.8	-4.3	**315.7**
1971	11.5	91.1	131.6	100.5	0.6	-8.8	**326.5**
1972	13.2	87.0	144.5	98.0	0.5	-8.1	**335.1**
1973	15.2	93.1	155.0	78.1	0.5	-1.3	**340.7**
1974	14.7	81.7	156.9	101.5	0.2	-8.8	**346.2**
1975	18.6	81.2	152.4	105.8	0.1	-20.7	**337.4**
1976	42.2	75.4	165.8	128.6	0.4	-54.7	**357.7**
1977	57.8	71.6	162.6	88.3	0.5	-28.7	**352.0**
1978	57.6	72.7	170.8	121.3	0.5	-50.5	**372.4**
1979	63.4	69.1	185.9	107.1	0.5	-40.5	**385.6**
1980	60.2	61.5	162.7	103.5	0.2	-38.6	**349.4**
1981	62.5	53.0	144.4	118.3	0.4	-51.7	**327.0**
1982	48.6	52.8	130.8	114.1	0.3	-39.9	**306.8**
1983	42.8	46.6	148.5	121.6	0.4	-48.2	**311.7**
1984	90.3	47.1	148.6	114.7	0.6	-45.9	**355.4**
1985	99.1	47.3	157.2	105.9	0.6	-45.8	**364.3**
1986	133.3	41.1	136.4	111.4	0.6	-84.6	**338.2**
1987	132.9	39.6	135.9	91.8	0.5	-83.5	**317.2**
1988	181.5	42.9	137.9	84.3	0.6	-119.1	**328.0**
1989	178.4	46.7	147.8	98.8	0.7	-129.5	**342.9**
1990	166.1	44.4	146.9	110.8	0.8	-130.8	**338.1**

[1] Includes supplemental gaseous fuels.

[2] This table gives the Btu equivalent of the physical units shown in Table 1.3. In the source document, DOE uses fossil fuel equivalent conversion factors to convert kilowatt-hours of hydroelectric generation to British thermal units. The reader is cautioned that much of the electricity generated in Montana is produced at hydroelectric plants. Therefore, DNRC feels that the use of these conversion factors may result in misleading estimates of the amount of electrical energy consumed in, or exported from, Montana.

[3] Consumed at utilities to produce electricity.

[4] Net interstate flow of electricity with losses, is the difference between the amounts of energy in the electricity sold within a state (including associated generation and transmission losses) and the energy input at the electric utilities within the state. The net interstate flows, therefore, include associated electrical energy losses. A negative number indicates that more electricity (including associated losses) went out of the state than came into the state.

NOTE: Does not include wood consumed by the nonutility sectors. Also excludes small quantities of other energy sources for which consistent historical data are not available, such as solar energy obtained by the use of thermal and photovoltaic collectors, wind energy, and geothermal, biomass, and waste energy other than that consumed at the electric utilities.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates; 1960–1990* (EIA-0214).

Table 1.5. Consumption of Energy by Sector, 1960-90 (trillion Btu)

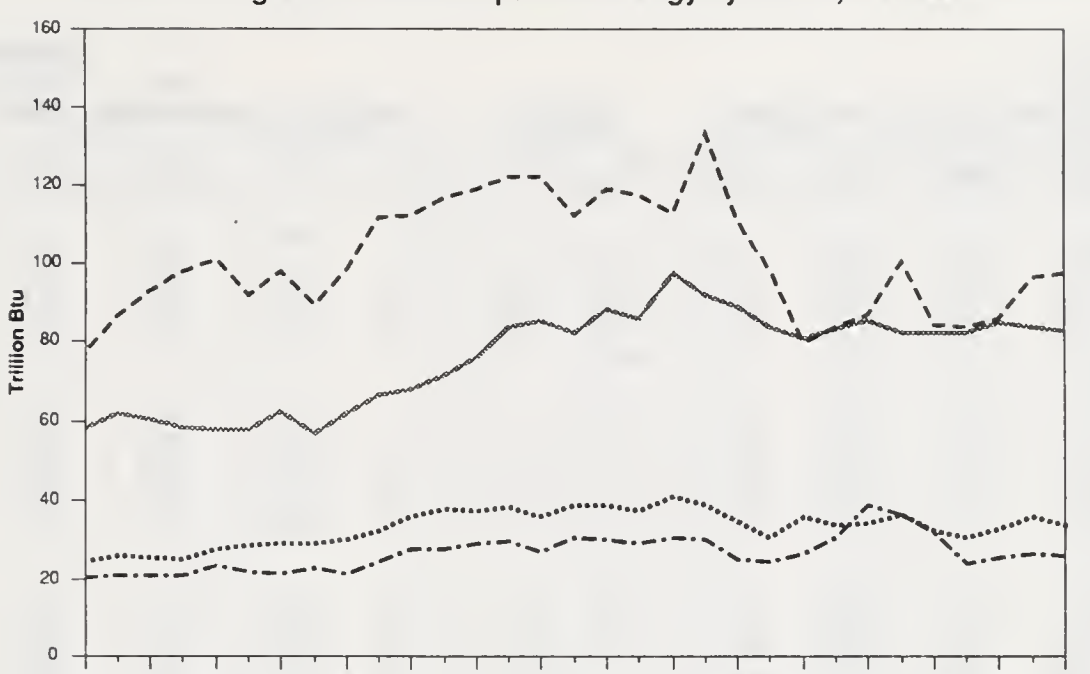
Year	Residential	Commercial	Industrial	Transportation	Net Consumption[1]	Electrical System Losses[2]	TOTAL[1]
1960	24.5	20.5	77.7	58.2	180.9	38.7	**219.8**
1961	25.8	20.7	86.8	61.8	195.1	39.1	**234.1**
1962	25.7	20.7	92.9	60.4	199.7	40.5	**240.2**
1963	25.2	21.2	97.9	58.2	202.5	41.6	**244.1**
1964	27.4	23.4	101.3	57.8	209.9	45.1	**254.9**
1965	28.4	21.9	92.1	57.8	200.2	49.5	**249.7**
1966	28.9	21.3	98.1	62.1	210.4	56.5	**267.0**
1967	29.3	22.9	89.4	56.8	198.4	53.9	**252.3**
1968	30.0	21.3	98.5	61.7	211.5	60.6	**272.0**
1969	32.3	24.6	111.8	66.2	234.9	71.6	**306.5**
1970	35.7	27.3	112.2	68.1	243.3	72.3	**315.7**
1971	37.6	27.6	116.7	71.3	253.2	73.4	**326.5**
1972	37.2	29.3	119.2	76.0	261.7	73.4	**335.1**
1973	38.4	29.7	121.8	83.8	273.7	67.1	**340.7**
1974	35.5	27.1	121.8	85.5	269.9	76.3	**346.2**
1975	39.0	30.5	112.1	82.1	263.7	73.6	**337.4**
1976	39.0	30.1	118.9	88.3	276.3	81.5	**357.7**
1977	37.3	28.9	117.5	85.8	269.5	82.4	**352.0**
1978	40.9	30.8	113.1	97.5	282.3	90.1	**372.4**
1979	38.6	30.3	133.4	91.7	294.0	91.6	**385.6**
1980	35.0	24.8	110.9	88.9	259.6	89.8	**349.4**
1981	30.8	24.6	98.7	83.8	237.9	89.1	**327.0**
1982	35.8	26.5	79.6	80.8	222.7	84.2	**306.8**
1983	33.7	30.7	83.8	83.3	231.5	80.2	**311.7**
1984	34.4	38.8	86.9	85.4	245.5	109.9	**355.4**
1985	36.0	36.0	100.5	82.2	254.7	109.6	**364.3**
1986	32.3	31.4	84.2	82.2	230.1	108.1	**338.2**
1987	30.4	24.2	83.6	82.4	220.6	96.6	**317.2**
1988	32.6	25.4	85.7	84.6	228.3	99.7	**328.0**
1989	35.9	26.8	96.5	83.8	243.0	99.9	**342.9**
1990	33.8	26.1	97.7	82.7	240.3	97.8	**338.1**

[1] Due to the lack of consistent historical data, statistics exclude wood, waste, geothermal, wind, photovoltaic, and solar thermal energy (except for small amounts used by electric utilities to generate electricity for distribution).

[2] Incurred in the generation, transmission, and distribution of electricity plus plant use and unaccounted for electrical system energy losses. In the source document, DOE uses fossil fuel equivalent conversion factors to convert kilowatt-hours of hydroelectric generation to British thermal units. The reader is cautioned that much of the electricity generated in Montana is produced at hydroelectric plants. Therefore, DNRC feels that the use of these conversion factors may result in a misleading estimate of the electrical system losses.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates; 1960-90* (EIA-0214).

Figure 1.3. Consumption of Energy by Sector, 1960-90



SOURCE: Table 1.5

Table 1.6. Residential Energy Consumption Estimates, 1960-90

	COAL		NATURAL GAS[1]		PETROLEUM		ELECTRICITY		NET CONSUMPTION[2]	ELECTRICAL SYSTEM LOSSES[3]	TOTAL[2]
YEAR	TBtu	Mtons	TBtu	Bcf	TBtu	Mbbl	TBtu	GWh	TBtu	TBtu	TBtu
1960	0.2	11	17.5	17	3.6	768	3.2	935	24.5	7.9	**32.4**
1961	0.2	10	17.8	17	4.4	951	3.4	982	25.8	8.2	**33.9**
1962	0.2	10	17.8	17	4.2	895	3.6	1,041	25.7	8.5	**34.3**
1963	0.2	9	17.4	17	3.9	827	3.7	1,077	25.2	8.8	**34.0**
1964	0.2	9	18.9	19	4.4	967	3.9	1,139	27.4	9.3	**36.7**
1965	0.2	8	19.9	20	4.2	914	4.1	1,216	28.4	9.9	**38.3**
1966	0.2	8	19.7	20	4.7	1,043	4.3	1,261	28.9	10.3	**39.2**
1967	0.2	9	19.7	20	5.0	1,191	4.4	1,291	29.3	10.5	**39.8**
1968	0.1	7	19.7	20	5.5	1,318	4.7	1,373	30.0	11.2	**41.2**
1969	0.1	6	21.4	21	5.8	1,361	5.0	1,462	32.3	11.9	**44.2**
1970	0.1	4	25.6	25	4.8	1,137	5.2	1,534	35.7	12.7	**48.4**
1971	0.1	7	26.2	25	5.7	1,302	5.6	1,633	37.6	13.5	**51.1**
1972	0.1	4	24.5	24	6.7	1,531	6.0	1,757	37.2	14.4	**51.7**
1973	0.1	5	25.6	25	6.5	1,460	6.2	1,812	38.4	14.8	**53.2**
1974	0.1	4	22.0	22	7.0	1,569	6.4	1,873	35.5	15.6	**51.1**
1975	0.1	4	24.6	24	7.0	1,562	7.3	2,143	39.0	17.6	**56.6**
1976	0.1	3	23.8	24	7.5	1,640	7.7	2,261	39.0	18.6	**57.6**
1977	*	1	21.7	22	7.2	1,609	8.3	2,440	37.3	20.1	**57.4**
1978	0.1	6	22.9	23	8.5	1,933	9.4	2,754	40.9	23.0	**63.9**
1979	0.1	4	22.3	23	6.2	1,280	10.1	2,957	38.6	24.3	**63.0**
1980	0.1	5	19.5	19	5.5	1,250	9.9	2,916	35.0	24.2	**59.2**
1981	*	3	17.4	17	3.4	777	9.9	2,906	30.8	23.6	**54.4**
1982	0.1	3	20.2	20	4.7	1,088	10.8	3,178	35.8	26.0	**61.8**
1983	0.1	3	17.1	17	6.0	1,365	10.6	3,097	33.7	25.3	**59.0**
1984	*	2	18.5	18	4.3	902	11.5	3,375	34.4	26.7	**61.1**
1985	*	3	19.4	19	4.2	959	12.3	3,614	36.0	28.9	**64.9**
1986	0.1	8	16.8	17	4.5	1,006	11.0	3,214	32.3	25.1	**57.5**
1987	*	3	15.6	15	4.0	957	10.7	3,139	30.4	24.4	**54.8**
1988	0.1	3	17.3	17	4.0	951	11.3	3,301	32.6	25.4	**58.0**
1989	0.4	19	18.5	18	5.2	1,198	11.8	3,456	35.9	26.4	**62.3**
1990	0.4	20	17.3	17	4.6	1,102	11.5	3,358	33.8	25.0	**58.8**

1 Includes supplemental gaseous fuels.

2 Due to the lack of consistent historical data, statistics exclude wood, waste, geothermal, wind, photovoltaic, and solar thermal energy (except for small amounts used by electric utilities to generate electricity for distribution).

3 Incurred in the generation, transmission, and distribution of electricity plus plant use and unaccounted for electrical system energy losses. In the source document, DOE uses fossil fuel equivalent conversion factors to convert kilowatt-hours of hydroelectric generation to British thermal units. The reader is cautioned that much of the electricity generated in Montana is produced at hydroelectric plants. Therefore, DNRC feels that the use of these conversion factors may result in a misleading estimate of the electrical system losses.

* Btu value less than 0.05.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates; 1960-90* (EIA-0214).

Table 1.7. Commercial Energy Consumption Estimates, 1960-90

	COAL		NATURAL GAS[1]		PETROLEUM		ELECTRICITY		NET CONSUMPTION[2]	ELECTRICAL SYSTEM LOSSES[3]	TOTAL[2]
YEAR	TBtu	Mtons	TBtu	Bcf	TBtu	Mbbl	TBtu	GWh	TBtu	TBtu	TBtu
1960	0.4	20	12.3	12	5.5	989	2.3	688	20.5	5.8	**26.4**
1961	0.4	18	12.6	12	5.2	944	2.5	740	20.7	6.2	**26.9**
1962	0.4	19	12.8	12	4.8	866	2.7	789	20.7	6.5	**27.1**
1963	0.4	18	12.6	13	5.3	960	2.8	833	21.2	6.8	**27.9**
1964	0.4	17	13.1	13	6.9	1,255	2.9	858	23.4	7.0	**30.3**
1965	0.3	15	14.1	14	4.3	800	3.2	925	21.9	7.5	**29.5**
1966	0.3	15	14.1	14	3.5	662	3.4	986	21.3	8.1	**29.4**
1967	0.3	16	15.5	16	3.6	691	3.5	1,039	22.9	8.5	**31.4**
1968	0.3	12	13.6	14	3.7	717	3.7	1,078	21.3	8.8	**30.1**
1969	0.2	11	16.6	17	4.0	759	3.8	1,111	24.6	9.1	**33.6**
1970	0.2	8	19.2	19	3.9	755	4.1	1,187	27.3	9.8	**37.1**
1971	0.3	12	18.7	18	4.3	817	4.3	1,258	27.6	10.4	**38.0**
1972	0.2	8	19.7	19	4.9	935	4.5	1,322	29.3	10.9	**40.2**
1973	0.2	9	19.7	19	5.1	953	4.7	1,371	29.7	11.2	**40.9**
1974	0.2	8	16.9	17	5.3	988	4.7	1,370	27.1	11.4	**38.5**
1975	0.1	7	19.0	19	5.8	1,071	5.6	1,645	30.5	13.5	**44.1**
1976	0.1	6	18.1	18	6.0	1,116	5.9	1,728	30.1	14.2	**44.3**
1977	*	2	16.8	17	5.9	1,086	6.2	1,814	28.9	14.9	**43.8**
1978	0.2	10	17.7	18	6.3	1,188	6.6	1,926	30.8	16.1	**46.9**
1979	0.1	7	17.2	17	6.0	1,080	7.0	2,061	30.3	17.0	**47.3**
1980	0.2	9	14.4	14	3.1	591	7.1	2,094	24.8	17.4	**42.2**
1981	0.1	5	13.8	14	3.1	579	7.5	2,202	24.6	17.9	**42.5**
1982	0.1	6	16.1	16	2.2	445	8.0	2,339	26.5	19.2	**45.6**
1983	0.1	5	13.6	14	8.5	1,511	8.5	2,499	30.7	20.4	**51.2**
1984	0.1	4	14.3	14	7.8	1,370	16.6	4,874	38.8	38.6	**77.4**
1985	0.1	5	14.8	15	6.6	1,167	14.5	4,245	36.0	34.0	**69.9**
1986	0.3	14	12.5	13	3.4	636	15.2	4,456	31.4	34.9	**66.3**
1987	0.1	5	11.2	11	2.7	522	10.2	2,979	24.2	23.2	**47.3**
1988	0.1	6	12.3	12	2.1	410	10.9	3,202	25.4	24.7	**50.1**
1989	0.7	34	13.4	13	2.2	440	10.5	3,070	26.8	23.5	**50.2**
1990	0.7	37	12.5	12	1.9	390	11.0	3,237	26.1	24.1	**50.3**

[1] Includes supplemental gaseous fuels.

[2] Due to the lack of consistent historical data, statistics exclude wood, waste, geothermal, wind, photovoltaic, and solar thermal energy (except for small amounts used by electric utilities to generate electricity for distribution).

[3] Incurred in the generation, transmission, and distribution of electricity plus plant use and unaccounted for electrical system energy losses. In the source document, DOE uses fossil fuel equivalent conversion factors to convert kilowatt-hours of hydroelectric generation to British thermal units. The reader is cautioned that much of the electricity generated in Montana is produced at hydroelectric plants. Therefore, DNRC feels that the use of these conversion factors may result in a misleading estimate of the electrical system losses.

* Btu value less than 0.05.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates; 1960-90* (EIA-0214).

Table 1.8. Industrial Energy Consumption Estimates, 1960-90

	COAL		NATURAL GAS[1]		PETROLEUM		ELECTRICITY		NET CONSUMPTION[2]	ELECTRICAL SYSTEM LOSSES[3]	TOTAL[2]
YEAR	TBtu	Mtons	TBtu	Bcf	TBtu	Mbbl	TBtu	GWh	TBtu	TBtu	TBtu
1960	0.8	36	27.0	26	39.8	6,647	10.1	2,951	77.7	25.0	**102.7**
1961	1.0	45	29.2	28	46.4	7,757	10.1	2,973	86.8	24.7	**111.5**
1962	1.1	49	29.9	29	51.2	8,513	10.6	3,114	92.9	25.5	**118.4**
1963	1.0	44	32.0	32	54.0	8,993	10.9	3,191	97.9	26.0	**124.0**
1964	1.4	62	33.7	34	54.1	8,977	12.1	3,544	101.3	28.8	**130.1**
1965	1.2	52	34.3	34	43.2	7,255	13.4	3,939	92.1	32.1	**124.2**
1966	1.0	45	34.9	35	46.3	7,791	15.9	4,657	98.1	38.1	**136.3**
1967	0.7	31	28.4	28	45.6	7,741	14.6	4,282	89.4	34.9	**124.3**
1968	0.7	32	28.3	28	52.5	8,851	17.0	4,982	98.5	40.6	**139.1**
1969	0.6	25	38.1	38	52.0	8,738	21.2	6,208	111.8	50.6	**162.4**
1970	0.6	28	42.5	41	48.5	8,107	20.6	6,029	112.2	49.8	**162.1**
1971	0.8	40	44.3	43	51.1	8,549	20.5	5,999	116.7	49.5	**166.2**
1972	1.0	49	40.3	39	57.9	9,699	20.0	5,858	119.2	48.1	**167.3**
1973	0.9	44	43.4	42	60.3	10,078	17.2	5,034	121.8	41.1	**162.9**
1974	1.2	56	39.7	39	60.8	10,108	20.2	5,929	121.8	49.3	**171.2**
1975	1.0	50	34.6	34	58.9	9,853	17.6	5,160	112.1	42.5	**154.6**
1976	2.4	124	31.2	31	65.0	10,843	20.2	5,922	118.9	48.7	**167.5**
1977	3.5	186	30.4	30	63.9	10,660	19.7	5,759	117.5	47.4	**164.9**
1978	3.5	190	29.4	29	59.4	9,876	20.8	6,106	113.1	51.0	**164.1**
1979	4.2	213	24.9	25	83.5	13,833	20.9	6,111	133.4	50.3	**183.7**
1980	2.9	154	20.3	20	67.8	11,426	19.8	5,815	110.9	48.2	**159.1**
1981	5.4	276	17.5	17	56.0	9,314	20.0	5,848	98.7	47.6	**146.3**
1982	4.3	222	13.7	14	45.3	7,644	16.2	4,759	79.6	39.0	**118.6**
1983	3.3	169	13.9	14	52.3	8,798	14.4	4,217	83.8	34.5	**118.3**
1984	3.1	164	12.0	12	52.6	8,910	19.2	5,631	86.9	44.6	**131.5**
1985	4.1	225	10.3	10	66.2	11,386	19.9	5,841	100.5	46.7	**147.2**
1986	5.7	320	9.3	9	48.2	8,160	21.0	6,150	84.2	48.1	**132.3**
1987	3.4	192	10.1	10	48.6	8,321	21.5	6,304	83.6	49.0	**132.7**
1988	3.9	215	10.6	10	49.2	8,359	22.0	6,438	85.7	49.6	**135.3**
1989	3.6	197	11.9	12	58.7	10,008	22.3	6,535	96.5	50.0	**146.5**
1990	4.0	220	12.0	12	59.4	10,193	22.3	6,529	97.7	48.7	**146.3**

1 Includes supplemental gaseous fuels.

2 Due to the lack of consistent historical data, statistics exclude wood, waste, geothermal, wind, photovoltaic, and solar thermal energy (except for small amounts used by electric utilities to generate electricity for distribution).

3 Incurred in the generation, transmission, and distribution of electricity plus plant use and unaccounted for electrical system energy losses. In the source document, DOE uses fossil fuel equivalent conversion factors to convert kilowatt-hours of hydroelectric generation to British thermal units. The reader is cautioned that much of the electricity generated in Montana is produced at hydroelectric plants. Therefore, DNRC feels that the use of these conversion factors may result in a misleading estimate of the electrical system losses.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates; 1960-90* (EIA-0214).

Table 1.9. Transportation Energy Consumption Estimates, 1960-90

	COAL		NATURAL GAS[1]		PETROLEUM		ELECTRICITY		NET CONSUMPTION[2]	ELECTRICAL SYSTEM LOSSES[3]	TOTAL[2]
YEAR	TBtu	Mtons	TBtu	Bcf	TBtu	Mbbl	TBtu	GWh	TBtu	TBtu	TBtu
1960	*	1	0.5	*	57.7	10,624	NA	NA	58.2	NA	58.2
1961	*	*	1.4	1	60.4	11,119	NA	NA	61.8	NA	61.8
1962	*	*	1.3	1	59.0	10,852	NA	NA	60.4	NA	60.4
1963	*	*	1.2	1	57.0	10,488	NA	NA	58.2	NA	58.2
1964	*	*	1.3	1	56.5	10,387	NA	NA	57.8	NA	57.8
1965	*	*	0.4	*	57.3	10,536	NA	NA	57.8	NA	57.8
1966	*	*	0.4	*	61.7	11,319	NA	NA	62.1	NA	62.1
1967	*	*	0.8	1	56.0	10,360	NA	NA	56.8	NA	56.8
1968	*	*	0.6	1	61.1	11,292	NA	NA	61.7	NA	61.7
1969	*	*	0.6	1	65.6	12,106	NA	NA	66.2	NA	66.2
1970	*	*	0.7	1	67.4	12,428	NA	NA	68.1	NA	68.1
1971	*	*	0.8	1	70.5	13,010	NA	NA	71.3	NA	71.3
1972	*	*	1.1	1	74.9	13,827	NA	NA	76.0	NA	76.0
1973	*	*	1.7	2	82.1	15,149	NA	NA	83.8	NA	83.8
1974	*	*	1.8	2	83.7	15,400	NA	NA	85.5	NA	85.5
1975	*	*	1.8	2	80.4	14,786	0.0	0	82.1	0.0	82.1
1976	*	*	1.5	1	86.8	15,987	0.0	0	88.3	0.0	88.3
1977	*	*	1.5	1	84.3	15,522	0.0	0	85.8	0.0	85.8
1978	0.0	0	1.5	2	95.9	17,692	0.0	0	97.5	0.0	97.5
1979	0.0	0	2.3	2	89.4	16,403	0.0	0	91.7	0.0	91.7
1980	0.0	0	2.9	3	86.0	15,786	0.0	0	88.9	0.0	88.9
1981	0.0	0	2.1	2	81.7	15,075	0.0	0	83.8	0.0	83.8
1982	0.0	0	2.3	2	78.4	14,454	0.0	0	80.8	0.0	80.8
1983	0.0	0	1.7	2	81.6	15,036	0.0	0	83.3	0.0	83.3
1984	0.0	0	1.9	2	83.5	15,353	0.0	0	85.4	0.0	85.4
1985	0.0	0	2.2	2	80.0	14,708	0.0	0	82.2	0.0	82.2
1986	0.0	0	2.1	2	80.1	14,748	0.0	0	82.2	0.0	82.2
1987	0.0	0	2.0	2	80.3	14,775	0.0	0	82.4	0.0	82.4
1988	0.0	0	2.3	2	82.3	15,150	0.0	0	84.6	0.0	84.6
1989	0.0	0	2.5	2	81.3	14,957	0.0	0	83.8	0.0	83.8
1990	0.0	0	2.1	2	80.6	14,831	0.0	0	82.7	0.0	82.7

[1] Includes supplemental gaseous fuels.

[2] Due to the lack of consistent historical data, statistics exclude wood, waste, geothermal, wind, photovoltaic, and solar thermal energy (except for small amounts used by electric utilities to generate electricity for distribution).

[3] Incurred in the generation, transmission, and distribution of electricity plus plant use and unaccounted for electrical system energy losses. In the source document, DOE uses fossil fuel equivalent conversion factors to convert kilowatt-hours of hydroelectric generation to British thermal units. The reader is cautioned that much of the electricity generated in Montana is produced at hydroelectric plants. Therefore, DNRC feels that the use of these conversion factors may result in a misleading estimate of the electrical system losses.

* Btu value less than 0.5, or physical unit value less than 0.5.

NOTE: DOE's models included railroad usage of electricity in Montana as part of commercial energy consumption estimates. For 1960 to 1972, railroad usage averaged 80 GWh, or 0.3 TBtu.

SOURCES: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates; 1960-90* (EIA-0214). Montana Power Company, *Load Forecast and Integrated Least Cost Resource Plan*, March 1992 (railroad electricity consumption).

Chapter 2: Electricity

Electric Generating Facilities

Electricity in Montana is produced mainly at hydropower dams (47 percent of generating capacity) and coal-fired power plants (52 percent of generating capacity). Montana Power Company (MPC) owns approximately 30 percent of the state's total generating capacity. Federal dams provide a combined total of approximately 27 percent.

The only recent changes to Montana generating facilities are the capacity upgrade at Hungry Horse from 320.9 megawatts to 356.6 megawatts in 1991 and the generator nameplate upgrade at the Milltown hydro facility from 3 megawatts to 3.2 megawatts in 1992. MPC is proposing to add up to 73.6 megawatts of generating capacity through upgrades and expansions at its Madison, Hauser, Rainbow and Ryan facilities, and through operational changes at its Cochrane, Ryan and Morony facilities.

In the following tables, MPC's Frank Bird and Flint Creek facilities are not counted as part of the total Montana generating capacity. Two proposals to refurbish the Frank Bird coal-fired facility, which was mothballed in 1984, were recently submitted when MPC requested bids for resources. Similarly, the Flint Creek hydropower facility, which was mothballed in 1989, is in the process of being sold to Granite County.

Generating capacity for several small non-utility generating facilities throughout Montana are included in this publication. The Public Utility Regulatory Policies Act of 1978 (PURPA) established criteria under which non-utility generators or qualifying facilities (QFs) could sell power to utilities. The two largest QFs in Montana, the Broadwater hydro facility and Montana One coal-fired facility, sell power to MPC. MPC also purchases power from ten smaller hydro QFs (South Dry Creek, Barney Creek, Cascade Creek, Jenni Hydro, Little Gold Creek, Pine Creek, Pony Hydro, Potosi Power, Strawberry Creek and Wisconsin Creek) and three wind QFs (Healow #2, Livingston and Mission Creek). PacifiCorp is the only other utility to purchase power from a QF in Montana, the Whitefish hydro facility. This facility was recently purchased by the City of Whitefish from Solar Research.

Net Electric Generation

Montana's net electric generation reached a new high in 1991 when 28.2 billion kilowatt-hours were generated. Coal-fired facilities generated 16.1 billion kilowatt-hours, 57 percent of Montana's total net generation. Over a quarter of the coal mined in Montana went to supply these facilities. Hydropower, which until 1985 was the dominant source of net electric generation in Montana, produced 42 percent of the total net generation in 1991. Less than 1 percent of net electric generation was produced from facilities fueled with petroleum, natural gas or wood.

Sharp fluctuations have occurred in both hydroelectric and coal-fired generation. Hydroelectric generation declined sharply in the drought years 1973, 1977, and 1987-88. Coal-fired generation increased sharply in 1976, 1977, 1984 and 1986 when the four Colstrip units began operation. Since the Colstrip units, which are partially owned by out-of-state utilities, came on line, out-of-state sale of electricity produced in Montana has increased. Prior to 1975, most electricity for export was produced at the Washington Water Power Company's Noxon Rapids hydro facility.

Sales of Electricity

In 1991, electricity sales in Montana reached 13.3 million kilowatt-hours, of which 6.6 million kilowatt-hours were in the industrial sector. Electricity sales in Montana have increased by an average 3.5 percent per year since 1960, but less than the U.S. growth rate of 4.6 percent per year. Annual growth of electricity sales for Montana's residential and commercial sectors during this time period averaged 4.2 and 5.9 percent per year, respectively, while the industrial sector averaged only 2.7 percent per year. Most of the lag in Montana sales growth after 1969 was in the industrial sector. Between 1960 and 1969, the sales growth in the industrial sector averaged 8.6 percent per year but only 0.3 percent per year between 1969 and 1991.

Similarly, most of the fluctuations in total sales were caused by the industrial sector which purchases approximately half of the electricity sold in Montana. The aluminum plant in Columbia Falls by itself used 3.0 million kilowatt-hours, a quarter of the electricity sold in Montana in 1991. Any fluctuation in aluminum production has a direct impact on Montana's total

sales and generation of electricity. Major fluctuations in industrial sales occurred in 1967, 1973, 1975 and 1982-84. The 1967 fluctuation was caused by a strike at the Anaconda smelter. The 1973, 1975 and 1982-84 fluctuations were caused by reduced production at the Columbia Falls aluminum plant.

Since August 1986, Bonneville Power Administration has sold power to the Columbia Falls aluminum plant under the Variable Industrial Power Rate, which fluctuates with the price of aluminum. This arrangement has stabilized not only the production of aluminum but also the sale of electricity to the plant. This is reflected in the industrial sector electrical sales since 1984.

MPC provides almost two-thirds of Montana's residential electricity sales. MPC and the other investor-owned utilities make almost three-quarters of the sales to the residential sector. Twenty-six other utilities, primarily cooperatives, account for the remainder of the residential sales. A similar pattern holds for the commercial sector. Industrial sales are primarily split between investor-owned utilities and the Bonneville Power Administration.

Average Electricity Price

The average price for electricity in Montana during 1990 was 3.96 cents per kilowatt-hour, compared to the national average of 6.58 cents per kilowatt-hour. The residential sector paid an average of 5.4 cents per kilowatt-hour, while the average Montana commercial and industrial customer paid 4.7 and 2.8 cents per kilowatt-hour, respectively. Residential customers served by cooperatives paid approximately 0.7 cents more per kilowatt-hour than customers served by investor-owned utilities in 1990.

The average annual price for electricity sold in all sectors in Montana has increased over the last 10 to 15 years. However when these prices are adjusted for inflation, real prices actually decreased from 1960 to 1980 and then increased only slightly through the 1980s. The price increases during the 1980s were due largely to the Colstrip units 1 through 3 coming into MPC's rate base. When compared to the rest of the nation, Montana had a 3 year lag in relative price growth between 1973 and 1987. After 1987, Montana's relative price growth has remained relatively consistent with the rest of the nation.

Table 2.1. Electric Power Generating Capacity by Company and Plant as of December 31, 1991

COMPANY	PLANT	COUNTY	ENERGY SOURCE	YEAR OF INITIAL OPERATION (First Unit)	CAPACITY (megawatts) GENERATOR NAMEPLATE	SUMMER CAPABILITY	WINTER CAPABILITY
Champion International Corp.	Lake Creek	Lincoln	Water	1917	4.5	4.7	4.4
	Libby	Lincoln	Wood & Waste Wood	1939	12.5	12.5	12.5
Mission Valley Power Co.	Hell Roaring	Lake	Water	1916	0.4	0.4	0.4
Montana Power Company	Black Eagle	Cascade	Water	1927	16.8	13.6	13.4
	Cochrane	Cascade	Water	1958	48.0	22.6	22.6
	Flint Creek[1]	Granite	Water	1901	-	-	-
	Frank Bird[2]	Yellowstone	Natural Gas	1951	-	-	-
	Hauser Lake	Lewis & Clark	Water	1907	17.0	10.1	12.4
	Holter	Lewis & Clark	Water	1918	38.4	20.7	26.2
	J. E. Corette	Yellowstone	Subbituminous Coal	1968	191.0	156.0	156.0
	Kerr	Lake	Water	1938	168.0	180.0	180.0
	Madison	Madison	Water	1906	9.2	8.5	8.5
	Milltown[3]	Missoula	Water	1906	3.0	2.6	2.2
	Morony	Cascade	Water	1930	45.0	22.1	22.1
	Mystic Lake	Stillwater	Water	1925	12.0	11.5	11.5
	Rainbow	Cascade	Water	1910	35.6	18.1	17.9
	Ryan	Cascade	Water	1915	48.0	54.6	54.8
	Thompson Falls	Sanders	Water	1915	30.0	35.2	39.8
Montana Power Company - 50%, Puget Sound Power & Light - 50%	Colstrip I	Rosebud	Subbituminous Coal	1975	358.4	330.0	330.0
Montana Power Company - 50%, Puget Sound Power & Light - 50%	Colstrip II	Rosebud	Subbituminous Coal	1976	358.4	330.0	330.0
Montana Power Company - 30%, Puget Sound Power & Light - 25%, Portland General Electric - 20%, Washington Water Power - 15%, PacifiCorp - 10%	Colstrip III	Rosebud	Subbituminous Coal	1983	778.0	700.0	700.0
Montana Power Company - 30%, Puget Sound Power & Light - 25%, Portland General Electric - 20%, Washington Water Power - 15%, PacifiCorp - 10%	Colstrip IV	Rosebud	Subbituminous Coal	1985	778.0	700.0	700.0
Montana Power Company-QFs							
Montana DNRC	Broadwater	Broadwater	Water	1989	10.0	-	-
Colstrip Energy Ltd. Partnership	Montana One	Rosebud	Waste Coal	1990	35.0	-	-
Other QFs	Various	Various	Water	Various	4.4	-	-
	Various	Park	Wind	Various	0.4	-	-
Montana-Dakota Utilities	Glendive	Dawson	Natural Gas/#2 Fuel Oil	1979	40.8	30.1	41.4
	Lewis & Clark	Richland	Lignite Coal/Natural Gas	1958	50.0	43.8	50.9
	Miles City	Custer	Natural Gas/#2 Fuel Oil	1972	23.3	20.0	29.4
PacifiCorp	Bigfork	Flathead	Water	1910	4.2	4.2	4.2
PacifiCorp-QF							
City of Whitefish[4]	Whitefish	Flathead	Water	1983	0.2	0.08	0.1
U.S. Dept. of the Army Corps of Engineers,							
North Pacific Division	Libby	Lincoln	Water	1975	525.0	603.8	565.0
Missouri River Division	Fort Peck	McCone	Water	1943	185.3	213.0	213.0
U.S Dept. of the Interior, Bureau of Reclamation,							
Great Plains Region	Canyon Ferry	Lewis & Clark	Water	1953	50.1	50.1	50.1
	Yellowtail	Big Horn	Water	1966	250.0	250.0	249.5
Pacific Northwest Region	Hungry Horse	Flathead	Water	1952	356.6	356.6	356.6
Washington Water Power Co.	Noxon Rapids	Sanders	Water	1959	460.7	554.0	554.0
TOTAL MONTANA CAPACITY (megawatts)					**4,948.2**	**4,758.9**	**4,758.9**

1 As of December 1992, Montana Power Company is in the process of selling Flint Creek Dam to Granite County. The license for this project is pending before the Federal Energy Regulatory Commission. The nameplate capacity of this facility may be upgraded from 1.1 megawatts to 2 megawatts under the new license.

2 The Frank Bird plant is currently inoperable. This plant has, however, been included in two refurbishing proposals submitted in response to MPC's request for bids to supply resources.

3 On June 19, 1992, the Federal Energy Regulatory Commission issued an order amending the license and revising annual charges to the Milltown facility. This order revised the generator nameplate capacity to 3.2 megawatts.

4 City of Whitefish obtained facility from Solar Research on May 1, 1992.

SOURCE: U.S. Department of Energy, Energy Information Administration, *Inventory of Power Plants in the U.S. 1991* (EIA-0095). QF (Qualifying Facilities) data provided by individual utilities.

Table 2.2. Net Electric Generation[1] and Fuel Consumption by Company and Plant, 1991

COMPANY / PLANT	GENERATION (Thousand kilowatt-hours)						FUEL CONSUMPTION		
	COAL	PETROLEUM	NATURAL GAS	HYDRO	OTHER[2]	TOTAL	COAL (Mtons)	PETROLEUM (Mbbl)	NAT. GAS (MMcf)
Champion International	0	0	0	27,847	62,336	90,183	0	0	0
Lake Creek				27,847					
Libby					62,336				
Mission Valley Power Co.	0	0	0	2,039	0	2,039	0	0	0
Hell Roaring				2,039					
Montana Power Company	15,917,949	17,066	9,434	3,465,628	0	19,410,077	10,008	39	72
Black Eagle				134,451					
Cochrane				292,908					
Colstrip[3]	15,104,170	17,066					9,492	39	
Hauser Lake				128,438					
Holter				254,134					
J. E. Corette	813,779		9,434				516		72
Kerr				1,318,393					
Madison				0					
Milltown				16,795					
Morony				287,811					
Mystic Lake				48,983					
Rainbow				239,818					
Ryan				423,120					
Thompson Falls				320,777					
Montana Power Co. - QFs	0	0	0	40,535	295,955	336,490	0	0	0
Broadwater				40,535					
Montana One					284,678				
Other					11,277				
Montana-Dakota Utilities	214,006	1	14,936	0	0	228,943	215	*	195
Glendive		1	9,158						116
Lewis & Clark	214,006		578				215		7
Miles City			5,200						72
PacifiCorp	0	0	0	28,095	0	28,095	0	0	0
Bigfork				28,095					
PacifiCorp - QF	0	0	0	438	0	438	0	0	0
Whitefish				438					
U.S.-Corps of Engineers	0	0	0	3,498,586	0	3,498,586	0	0	0
Fork Peck				737,101					
Libby				2,761,485					
U.S.-Bureau of Reclamation	0	0	0	2,765,090	0	2,765,090	0	0	0
Canyon Ferry				336,843					
Hungry Horse				1,457,881					
Yellowtail				970,366					
Washington Water Power Co.	0	0	0	2,133,784	0	2,133,784	0	0	0
Noxon Rapids				2,133,784					
TOTALS	16,131,955	17,067	24,370	11,962,042	358,291	28,493,725	10,223	39	267

* less than 0.5

1 Net generation equals gross generation minus plant use.

2 Other includes wood and waste wood, waste coal, and wind.

3 Includes total plant generation and fuel consumption for all four Colstrip units.

SOURCE: U.S. Department of Energy, Energy Information Administration, *Electric Power Monthly*, April 1992 (EIA-0226). QF (Qualifying Facilities) data provided by individual utilities.

Table 2.3. Annual Consumption of Fuels for Electric Generation, 1960-91

YEAR	COAL (thousand short tons)	PETROLEUM (thousand barrels)	NATURAL GAS (million cubic feet)
1960	186.9	*	341.3
1961	262.5	*	356.2
1962	291.6	1.3	3,712.5
1963	285.5	0.7	3,303.3
1964	293.8	3.6	2,449.5
1965	295.8	0.7	1,992.3
1966	323.5	82.2	2,977.2
1967	325.4	6.1	502.5
1968	399.2	22.9	631.3
1969	576.6	104.9	1,520.5
1970	722.7	26.0	2,529.4
1971	672.0	0.2	1,079.8
1972	768.7	17.5	1,217.4
1973	892.6	152.2	2,167.4
1974	854.6	14.0	1,038.0
1975	1,061.3	62.6	1,073.3
1976	2,373.7	81.1	708.5
1977	3,196.7	195.3	953.3
1978	3,184.2	98.1	909.4
1979	3,461.4	146.5	2,320.4
1980	3,351.6	58.6	4,182.1
1981	3,337.9	38.5	2,069.4
1982	2,595.8	30.6	337.0
1983	2,356.0	31.0	335.0
1984	5,113.0	78.0	360.0
1985	5,480.0	38.0	468.0
1986	7,438.0	25.0	407.0
1987	7,530.0	44.0	478.0
1988	10,410.0	63.0	286.0
1989	10,208.0	60.0	336.0
1990	9,399.0	63.0	418.0
1991 [P]	10,227.0	41.0	264.0

[P] Preliminary
* less than 0.05

SOURCES:Federal Energy Regulatory Commission, Form 4 News Releases (1960-76); U.S. Department of Energy, Energy Information Administration, *Electric Power Statistics*, EIA-0034 (1977-78); U.S. Department of Energy, Energy Information Administration, *Power Production, Fuel Consumption and Installed Capacity*, EIA-0049 (1979); U.S. Department of Energy, Energy Information Administration, *Electric Power Annual*, EIA-0348 (1980-89); U.S. Department of Energy, Energy Information Administration, *Electric Power Monthly*, March 1992, EIA-0226 (1990-91).

Table 2.4. Net Electric Generation[1] by Type of Fuel Unit, 1960-91

YEAR	HYDROELECTRIC (million kWh)	%	COAL (million kWh)	%	PETROLEUM (million kWh)	%	NATURAL GAS (million kWh)	%	WOOD AND WASTE WOOD (million kWh)	%	TOTAL
1960	5,801	97	NA		NA		NA		NA		5,992
1961	6,499	96	263	4	0	0	19		0	0	6,780
1962	6,410	91	291	4	1	*	349	5	0	0	7,051
1963	6,011	91	284	4	0	0	299	5	0	0	6,594
1964	6,821	93	286	4	2	*	220	3	31	*	7,360
1965	8,389	94	285	3	0	0	171	2	37	*	8,882
1966	7,940	92	317	4	43	*	273	3	38	*	8,611
1967	8,703	95	314	3	3	*	41	*	56	1	9,117
1968	8,925	94	434	5	10	*	52	*	74	1	9,495
1969	9,447	90	735	7	52	*	147	1	61	1	10,442
1970	8,745	87	966	10	14	*	228	2	73	1	10,026
1971	9,595	90	901	8	1	*	96	1	60	1	10,653
1972	9,444	88	1,079	10	7	*	108	1	50	*	10,689
1973	7,517	82	1,303	14	69	*	195	2	48	1	9,132
1974	9,726	88	1,210	11	6	*	98	1	16	*	11,056
1975	9,560	85	1,544	14	17	*	96	1	14	*	11,231
1976	12,402	77	3,558	22	27	*	67	*	37	*	16,091
1977	8,460	63	4,788	36	92	1	87	1	46	*	13,473
1978	11,708	70	4,871	29	35	*	84	*	52	*	16,750
1979	10,344	66	5,114	32	58	*	188	1	52	*	15,756
1980	9,966	64	5,140	33	22	*	351	2	17	*	15,496
1981	11,323	68	5,047	30	13	*	176	1	34	*	16,593
1982	10,920	74	3,853	26	10	*	33	*	28	*	14,844
1983	11,561	77	3,452	23	10	*	34	*	39	*	15,097
1984	11,112	59	7,650	40	36	*	40	*	57	*	18,896
1985	10,175	54	8,465	45	16	*	58	*	60	*	18,773
1986	10,857	48	11,469	51	9	*	52	*	61	*	22,448
1987	8,925	43	11,836	57	17	*	58	*	49	*	20,884
1988	8,237	33	16,462	66	30	*	37	*	55	*	24,821
1989	9,550	37	16,129	62	30	*	43	*	72	*	25,823
1990	10,672	41	14,903	58	27	*	41	*	75	*	25,719
1991[P]	11,921	42	16,132	57	18	*	24	*	62	*	28,157

* Less than or equal to 0.5 percent.

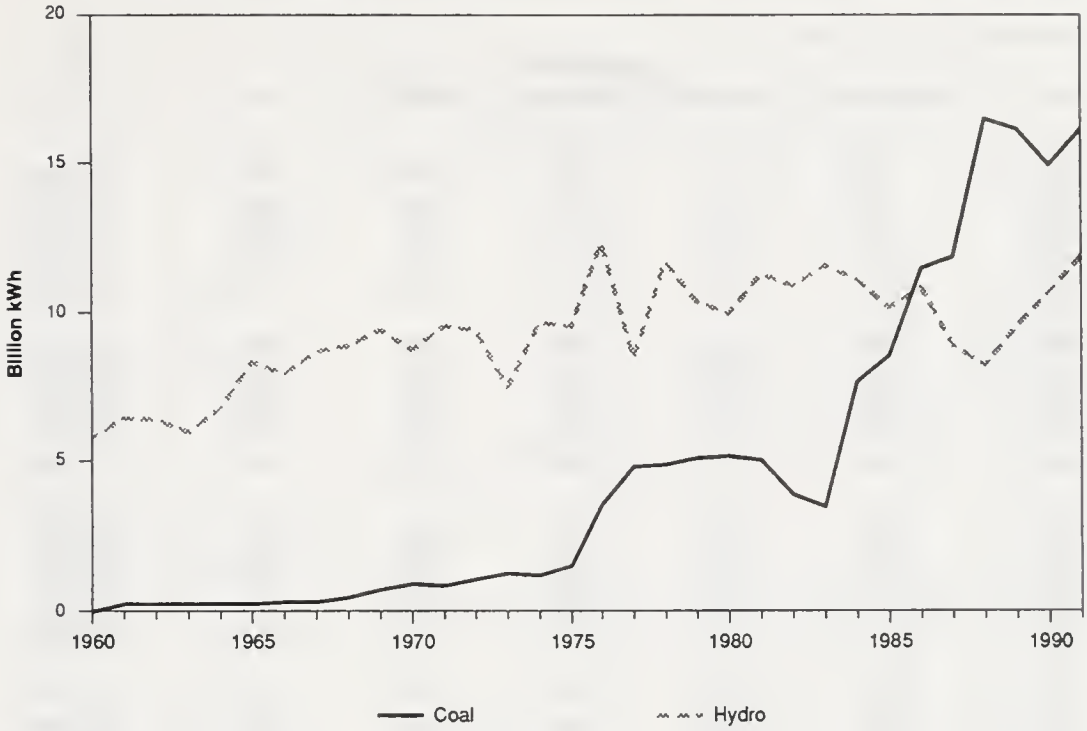
P Preliminary

1 Gross generation less the electric energy consumed at the generating station for all facilities owned by or selling to electric utilities and cooperatives.

SOURCES:

Federal Power Commission (1960-76); U.S. Department of Energy, Energy Information Administration, *Power Production, Fuel Consumption and Installed Capacity Data*, EIA-0049 (1977-80); U.S. Department of Energy, Energy Information Administration, *Electric Power Annual*, EIA-0348 (1981-89); U.S. Department of Energy, Energy Information Administration, *Electric Power Monthly*, March 1992, EIA-0226 (1990-91).

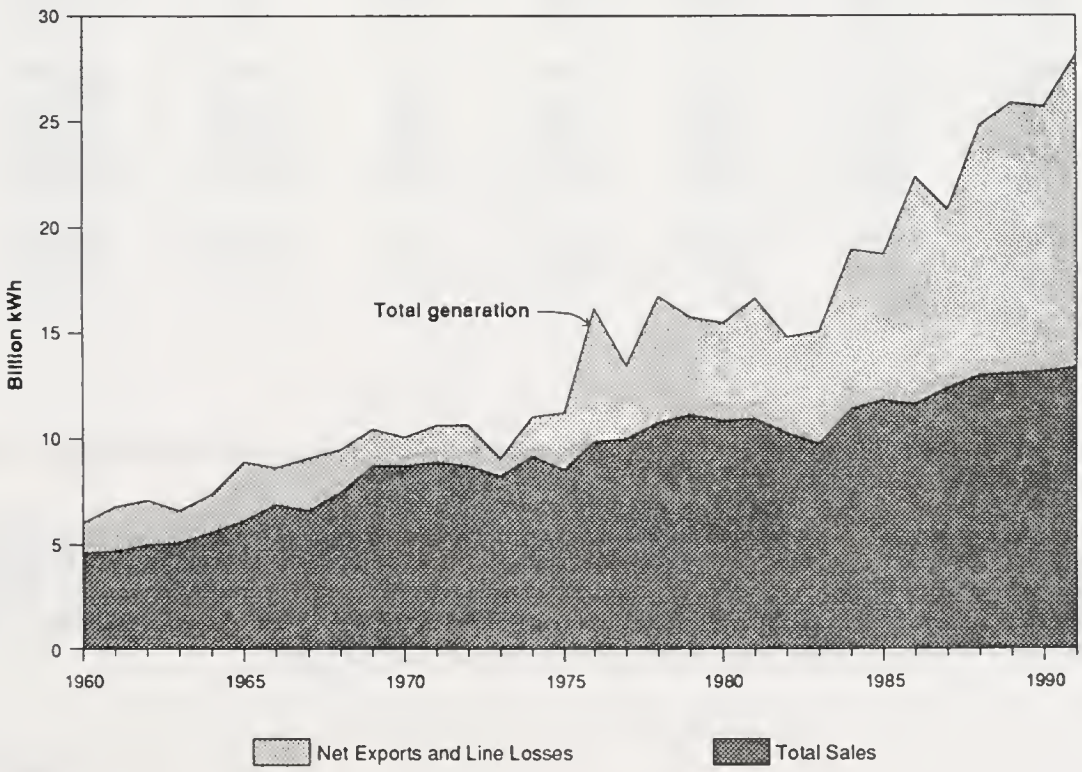
Figure 2.1. Annual Electric Generation by Type of Fuel Unit, 1960-91



NOTE: Other fuels (oil, natural gas, wood and waste wood) used to generate electricity are not shown because their contribution is negligible.

SOURCE: Table 2.4.

Figure 2.2. Generation and Sales of Electricity, 1960-91



SOURCES: Generation: Table 2.4.
Sales: Table 2.5.

Table 2.5. Annual Sales of Electricity, 1960-91 (million kilowatt-hours)

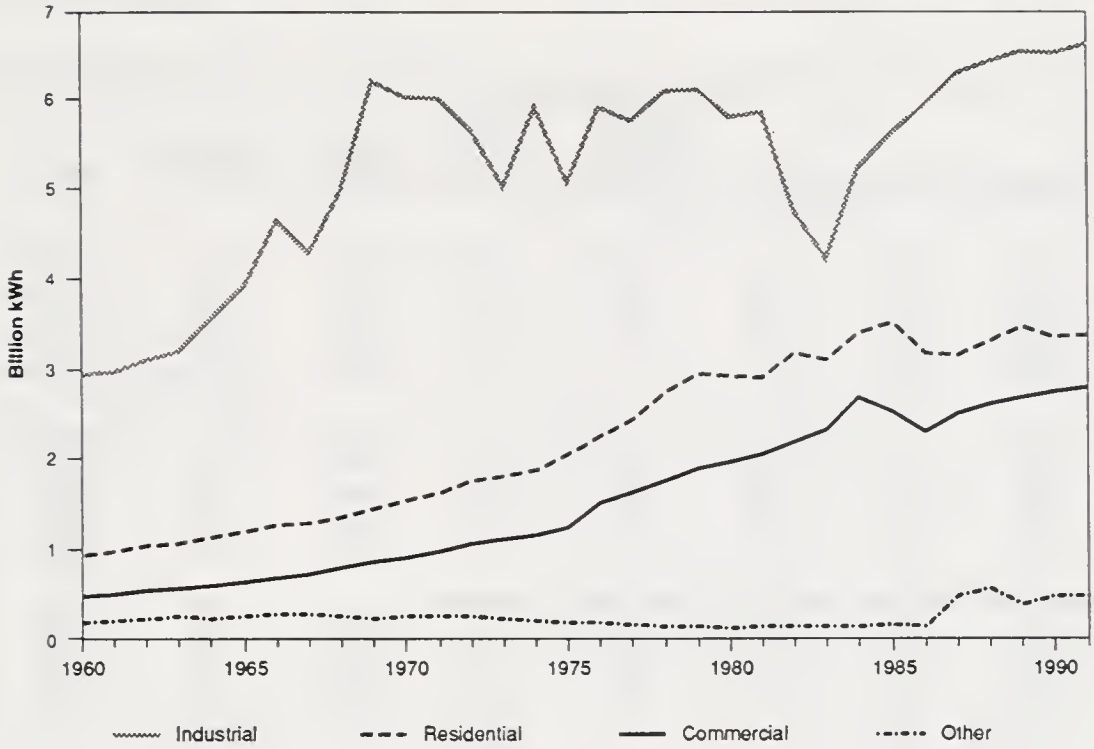
Year	MONTANA Residential	Commercial	Industrial	Other[1]	Total	U.S. TOTAL
1960	935	479	2,951	209	4,575	686,493
1961	982	518	2,975	222	4,697	720,120
1962	1,041	551	3,099	254	4,946	775,381
1963	1,077	574	3,191	259	5,101	830,079
1964	1,139	610	3,544	249	5,541	896,059
1965	1,216	654	3,939	270	6,080	959,493
1966	1,261	698	4,657	286	6,902	1,035,145
1967	1,291	746	4,282	293	6,612	1,099,137
1968	1,373	805	4,982	273	7,433	1,202,871
1969	1,462	863	6,208	247	8,781	1,312,406
1970	1,534	924	6,029	264	8,750	1,392,300
1971	1,633	990	5,999	268	8,890	1,469,306
1972	1,768	1,070	5,660	265	8,763	1,595,161
1973	1,812	1,125	5,034	246	8,217	1,713,380
1974	1,873	1,156	5,929	213	9,171	1,707,852
1975	2,058	1,250	5,069	197	8,575	1,736,267
1976	2,261	1,525	5,922	203	9,911	1,855,246
1977	2,440	1,625	5,759	189	10,013	1,948,361
1978	2,754	1,768	6,106	158	10,786	2,017,922
1979	2,957	1,907	6,111	154	11,129	2,071,099
1980	2,916	1,957	5,815	137	10,825	2,094,449
1981	2,906	2,045	5,848	157	10,956	2,147,103
1982	3,178	2,180	4,759	159	10,276	2,086,441
1983	3,097	2,334	4,217	166	9,813	2,150,955
1984	3,386	2,687	5,229	164	11,466	2,278,372
1985	3,505	2,521	5,623	173	11,822	2,309,543
1986	3,181	2,302	5,948	161	11,593	2,350,835
1987	3,139	2,495	6,304	484	12,423	2,457,272
1988	3,301	2,620	6,438	582	12,942	2,578,062
1989	3,456	2,670	6,535	400	13,061	2,646,809
1990	3,317	2,708	6,549	484	13,058	2,704,672
1991[P]	3,383	2,794	6,643	501	13,321	2,759,170

[P] Preliminary

[1] Includes public street and highway lighting, other sales to public authorities, sales to railroads and railways, and interdepartmental sales.

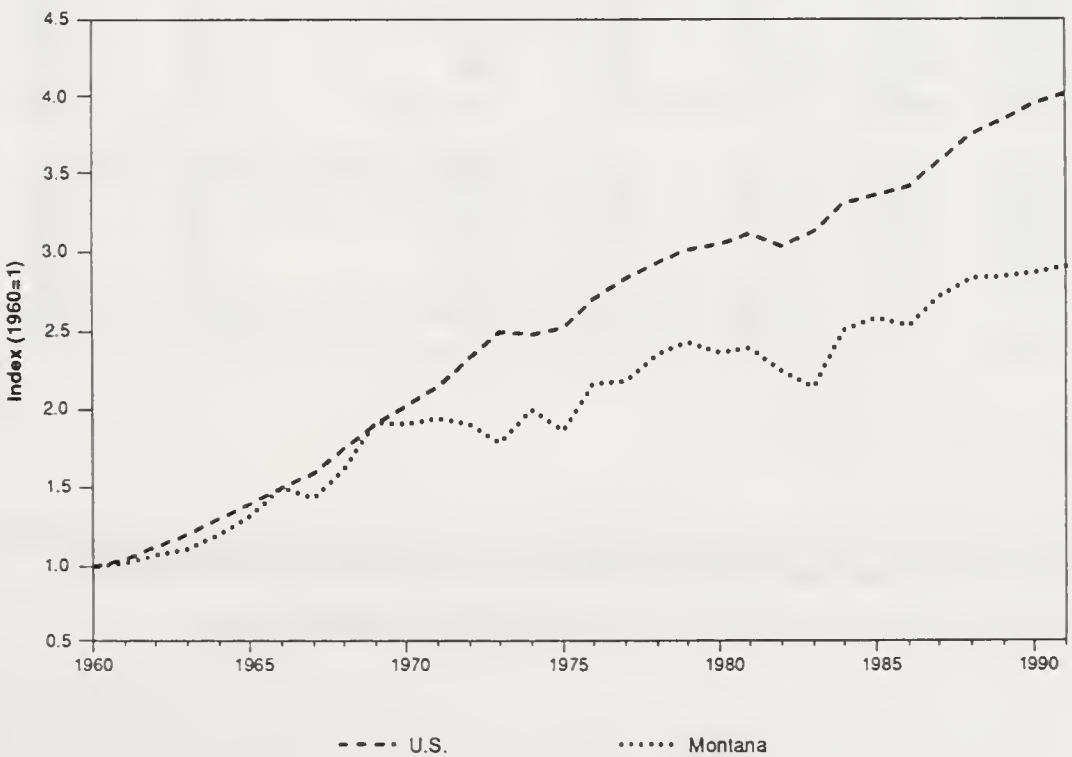
SOURCES: Federal Power Commission (1960-76); U.S. Department of Energy, Energy Information Administration, *Electric Power Statistics*, EIA-0034 (1977-78); U.S. Department of Energy, Energy Information Administration, *Financial Statistics of Electric Utilities and Interstate Natural Gas Pipeline Companies*, EIA-0147 (1979-80); U.S. Department of Energy, Energy Information Administration, *Electric Power Annual*, EIA-0348 (1981-89); U.S. Department of Energy, Energy Information Administration, *Electric Power Monthly*, March 1992, EIA-0226 (1990-91).

Figure 2.3. Annual Sales of Electricity, 1960-91



SOURCE: Table 2.5.

Figure 2.4. Montana and U.S. Sales Growth, 1960-91



SOURCE: Table 2.5.

INDEX = (Year's Value/1960 Value)

Table 2.6. Average Annual Prices for Electricity Sold, 1960-90 (cents per kilowatt-hour)

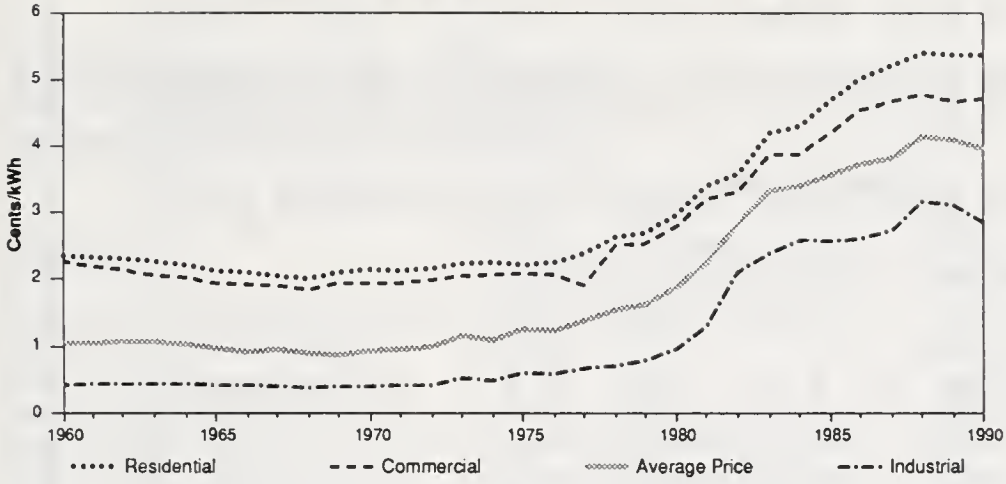
Year	MONTANA								U.S.
	Residential	Commercial	Industrial	Street & Highway Lighting	Other Public Authorities	Railroads & Railways	Interdepart-mental	All Sales	All Sales
1960	2.33	2.25	0.43	2.45	0.79	0.56	1.27	1.05	1.69
1961	2.32	2.18	0.45	2.70	0.74	0.55	1.70	1.06	1.69
1962	2.29	2.13	0.46	2.50	0.61	0.55	1.43	1.07	1.67
1963	2.25	2.06	0.45	2.78	0.78	0.57	1.67	1.07	1.64
1964	2.20	2.02	0.45	2.56	0.71	0.53	2.00	1.03	1.63
1965	2.12	1.93	0.44	2.75	0.70	0.59	1.67	0.98	1.59
1966	2.09	1.92	0.43	2.56	0.66	0.57	1.67	0.92	1.56
1967	2.04	1.89	0.42	2.79	0.63	0.49	1.08	0.95	1.55
1968	1.99	1.83	0.40	2.77	0.61	0.58	1.11	0.90	1.54
1969	2.10	1.93	0.41	2.75	0.57	0.53	1.05	0.88	1.54
1970	2.13	1.94	0.42	2.88	0.60	0.55	1.00	0.94	1.59
1971	2.12	1.94	0.43	3.02	0.62	0.50	0.95	0.95	1.68
1972	2.16	1.98	0.44	3.21	0.53	0.49	1.19	1.00	1.77
1973	2.21	2.04	0.53	3.27	0.60	0.58	1.67	1.16	1.86
1974	2.23	2.05	0.50	3.23	0.58	0.53	1.41	1.10	2.30
1975	2.19	2.08	0.62	2.99	0.58	–	1.51	1.25	2.70
1976	2.23	2.06	0.60	3.32	0.73	–	1.67	1.24	2.89
1977	2.38	1.90	0.67	3.53	0.80	–	1.79	1.38	3.21
1978	2.62	2.50	0.72	3.88	0.87	–	2.16	1.53	3.46
1979	2.67	2.52	0.80	3.86	0.87	–	1.99	1.62	3.82
1980	2.95	2.78	0.98	4.00	0.97	–	1.91	1.87	4.49
1981	3.38	3.19	1.30	4.50	1.42	–	2.34	2.24	5.16
1982	3.58	3.30	2.09	4.69	1.69	–	2.70	2.81	5.79
1983	4.19	3.88	2.37	5.28	1.83	–	3.01	3.31	6.00
1984	4.30	3.88	2.57	5.72	2.02	–	2.58	3.38	6.27
1985	4.70	4.20	2.55	7.35	2.08	–	2.15	3.56	6.47
1986	5.02	4.54	2.60	8.04	2.54	–	1.89	3.71	6.47
1987	5.23	4.68	2.72	8.79	2.65	–	3.49	3.83	6.39
1988	5.41	4.79	3.16	9.41	2.60	–	3.40	4.14	6.36
1989	5.38	4.68	3.09	10.57	2.83	–	3.32	4.09	6.47
1990[P]	5.38	4.72	2.83	11.08	2.58	–	3.87	3.96	6.58

[P] Preliminary.

NOTE: Average annual prices were calculated by dividing total revenue by total sales as reported by Edison Electric Institute. Edison Electric Institute data is slightly different from Department of Energy data presented in Table 2.5.

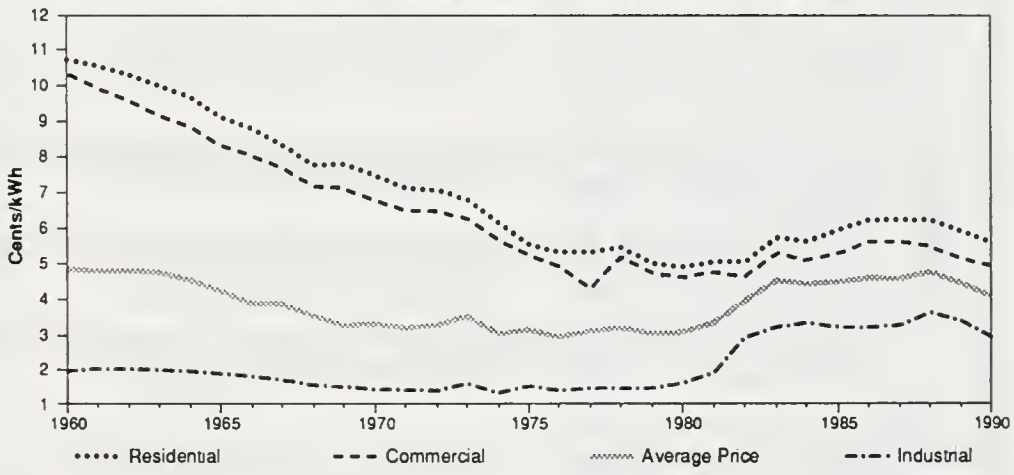
SOURCE: Edison Electric Institute, *Statistical Yearbook of the Electric Utility Industry*, 1960-90.

Figure 2.5. Nominal Electricity Prices, 1960-90



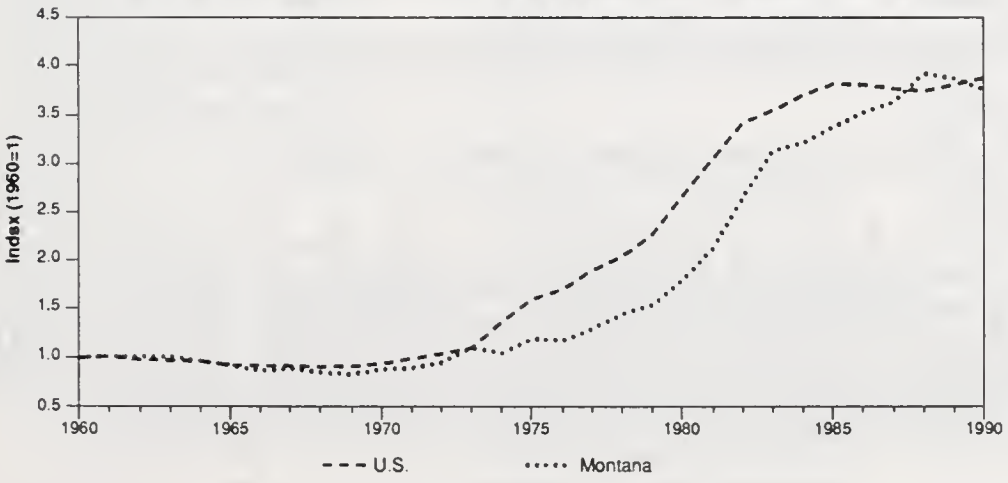
SOURCE: Table 2.6.

Figure 2.6. Real Electricity Prices, 1960-90 (1991 dollars)



SOURCE: Average Annual Prices: Table 2.6.
Consumer Price Index: Table 8.4.

Figure 2.7. Montana and U.S. Electricity Price Growth, 1960-90



SOURCE: Table 2.6.
INDEX = (Year's Value/1960 Value)

Table 2.7. Summary of Consumers, Revenue, Retail Sales, and Average Price per Kilowatt-hour, 1990

Electric Utility	Percent of Utility Sales in Montana	RESIDENTIAL				COMMERCIAL				INDUSTRIAL				TOTAL		
		Number of Consumers[1]	Revenue (thousand dollars)	Retail Sales (thousand kWh)	Average Price[2] (cents/kWh)	Number of Consumers[1]	Revenue (thousand dollars)	Retail Sales (thousand kWh)	Average Price[2] (cents/kWh)	Number of Consumers[1]	Revenue (thousand dollars)	Retail Sales (thousand kWh)	Average Price[2] (cents/kWh)	Revenue (thousand dollars)	Retail Sales (thousand kWh)	Average Price[2] (cents/kWh)
Investor-Owned		**250,143**	**118,043**	**2,227,194**	**5.3**	**45,040**	**103,225**	**2,290,988**	**4.5**	**2,618**	**109,361**	**3,329,428**	**3.3**	**339,543**	**7,981,856**	**4.3**
Black Hills Corporation	2	23	13	161	*	37	56	531	*	3	1,452	25,707	5.6	1,521	26,399	5.8
Montana Power Co.	100	206,819	94,732	1,812,199	5.2	36,284	84,599	1,928,558	4.4	2,238	92,303	2,918,151	3.2	279,638	6,776,525	4.1
Montana-Dakota Utilities Co.	26	18,761	9,702	130,093	7.5	4,174	9,140	158,029	5.8	170	8,206	179,540	4.6	27,827	482,046	5.8
PacifiCorp	2	24,528	13,586	284,529	4.8	4,540	9,417	203,660	4.6	207	7,400	206,030	3.6	30,534	696,464	4.4
Washington Water Power Co.	*	12	10	212	*	5	13	210	*	-	-	-	-	23	422	*
Publicly-Owned		**666**	**388**	**8,629**	**4.5**	**98**	**129**	**3,069**	**4.2**	**5**	**4**	**75**	*	**610**	**13,598**	**4.5**
Troy, City of	100	666	388	8,629	4.5	98	129	3,069	4.2	5	4	75	*	610	13,598	4.5
Cooperatives		**81,840**	**59,038**	**986,110**	**6.0**	**9,550**	**21,835**	**381,172**	**5.7**	**589**	**10,451**	**218,429**	**4.8**	**98,481**	**1,714,277**	**5.7**
Beartooth Electric Coop.	100	3,380	2,213	32,631	6.8	204	196	2,924	6.7	-	-	-	-	2,502	37,383	6.7
Big Flat Electric Coop.	100	1,286	943	15,538	6.1	172	1,614	31,117	5.2	-	-	-	-	2,745	50,279	5.5
Big Horn County Electric Coop.	92	2,490	1,868	26,161	7.1	318	452	5,491	8.2	38	634	8,536	7.4	3,055	41,441	7.4
Big Horn Rural Electric Co.	1	31	18	217	*	10	60	598	*	-	-	-	-	78	815	*
Fall River Rural Electric Coop.	21	820	658	9,000	7.3	390	1,105	18,000	6.1	-	-	-	-	1,763	27,000	6.5
Fergus Electric Coop.	100	3,157	3,107	49,174	6.3	296	623	11,418	5.5	67	412	9,100	4.5	4,319	72,512	6.0
Flathead Electric Coop.	100	7,990	5,110	104,824	4.9	1,025	1,561	32,056	4.9	-	-	-	-	6,805	139,514	4.9
Glacier Electric Coop.	100	4,999	3,244	57,450	5.6	1,282	3,629	73,937	4.9	4	288	6,392	4.5	7,381	142,424	5.2
Goldenwest Electric Coop.	43	559	350	3,751	9.3	11	206	2,292	9.0	-	-	-	-	556	6,043	9.2
Grand Electric Coop.	*	11	5	81	*	-	-	-	-	-	-	-	-	5	81	*
Hill County Electric Coop.	100	2,851	2,387	30,180	7.9	193	994	15,518	6.4	-	-	-	-	3,381	45,698	7.4
Lincoln Electric Coop.	100	2,270	1,452	31,635	4.6	382	732	15,492	4.7	8	1,723	31,345	5.5	3,950	79,264	5.0
Lower Yellowstone R E A	78	2,365	1,804	25,246	7.1	356	624	6,816	9.2	298	2,442	27,413	8.9	5,053	61,281	8.2
Marias River Electric Coop.	100	2,461	1,321	33,783	3.9	1,170	1,384	28,730	4.8	68	510	11,324	4.5	3,331	76,218	4.4
McCone Electric Coop.	100	4,143	2,706	34,079	7.9	436	1,104	16,117	6.8	-	-	-	-	3,924	51,737	7.6
McKenzie Electric Coop.	*	37	32	440	*	1	3	17	*	-	-	-	-	35	457	*
Mid-Yellowstone Electric Coop.	100	1,437	929	15,684	5.9	140	252	3,811	6.6	-	-	-	-	1,410	24,039	5.9
Missoula Electric Coop.	99	6,989	4,989	84,341	5.9	608	852	16,192	5.3	5	398	9,639	4.1	6,463	115,271	5.6
Northern Electric Coop.	100	1,102	1,072	18,698	5.7	152	787	9,956	7.9	-	-	-	-	1,973	30,356	6.5
Northern Lights	46	1,927	1,330	20,905	6.4	233	479	9,666	5.0	1	2,046	74,558	2.7	3,855	105,129	3.7
Park Electric Coop.	100	2,614	2,326	32,398	7.2	54	160	2,666	6.0	-	-	-	-	2,930	42,097	7.0
Ravalli County Electric Coop.	100	3,899	3,124	53,867	5.8	186	210	3,838	5.5	3	486	11,317	4.3	4,145	75,974	5.5
Sheridan Electric Coop.	92	1,733	1,505	26,082	5.8	530	2,855	40,948	7.0	-	-	-	-	4,539	69,083	6.6
Sheridan-Johnson Rural Electric	1	43	34	591	*	-	-	-	-	-	-	-	-	34	591	*
Southeast Electric Coop.	98	1,730	1,134	12,382	9.2	17	39	456	*	1	166	2,546	6.5	1,344	15,456	8.7
Sun River Electric Coop.	100	3,309	2,964	46,015	6.4	38	449	6,068	7.4	-	-	-	-	5,015	75,968	6.6
Tongue River Electric Coop.	100	3,125	2,217	44,675	5.0	416	330	6,735	4.9	34	688	15,227	4.5	3,672	73,130	5.0
Valley Electric Coop.	100	1,430	1,003	14,775	6.8	165	229	3,650	6.3	-	-	-	-	1,367	20,415	6.7
Vigilante Electric Coop.	100	4,770	3,177	56,934	5.6	88	211	3,614	5.8	5	138	2,404	5.7	5,308	101,871	5.2
Yellowstone Valley Electric Coop.	100	8,882	6,016	104,573	5.8	677	695	13,049	5.3	57	520	8,628	6.0	7,543	132,750	5.7
Federal		**10,173**	**5,549**	**136,452**	**4.1**	**1,945**	**2,918**	**62,297**	**4.7**	**3**	**67,332**	**2,981,394**	**2.3**	**80,910**	**3,414,852**	**2.4**
Bonneville Power Admin.	11	-	-	-	-	-	-	-	-	1	66,628	2,960,899	2.3	71,153	3,137,832	2.3
USBIA-Mission Valley Power	100	10,173	5,549	136,452	4.1	1,944	2,917	62,272	4.7	2	704	20,495	3.4	9,628	236,059	4.1
Western Area Power Admin.	1	-	-	-	-	1	1	25	*	-	-	-	-	129	40,961	0.3
Montana		**342,822**	**183,018**	**3,358,385**	**5.4**	**56,633**	**128,107**	**2,737,526**	**4.7**	**3,215**	**187,148**	**6,529,326**	**2.9**	**519,544**	**13,124,583**	**4.0**

* Utilities sales within Montana are less than .5 percent. Average Price not calculated.

1 The number of ultimate consumers is an average of the number of consumers at the close of each month.

2 Average price is the average revenue per kilowatt-hour of electricity sold, which is calculated by dividing revenue by sales. Electric revenue and sales data are reported by electric utilities in thousand dollars and thousand kilowatt-hours.

Average price for electric utilities with either less than $100,000 of revenue or less than 1 million kilowatt-hours of sales, are not calculated because the significance of the data are not sufficient to make the ratio meaningful.

Chapter 3: Coal

History

Coal was first mined in Montana during the 1860s when Colonel James D. Chesnut opened a mine near Bozeman to supply fuel for space heating. Business grew in the 1880s, when the Northern Pacific Railroad crossed Bozeman Pass and leased Chesnut's mine to supply locomotive fuel. The expansion of the railroads stimulated industrial development, and soon smelters in western Montana needed coal and coke. More mines opened to meet the growing demand. Nearly all coal production for 30 years was from underground mines in bituminous fields near Bozeman, Yellowstone Park, Great Falls and Red Lodge. Around 1910, underground mines opened near Roundup. After World War I, a strip mine producing subbituminous coal near Colstrip boosted state annual production to nearly 5 million tons by 1944.

After World War II, demand dwindled as customers switched from coal to natural gas and petroleum-based fuels. Production declined quickly to a low of around 300,000 tons in 1960, and remained near that level for about 8 years. For several years, the only large coal operation was a lignite mine near Savage, which supplied a Montana-Dakota Utilities power plant in Sidney. The bituminous coal mines shut down.

Production began to grow again in 1968, when Western Energy Company began shipping coal from Colstrip to a steam-electric generating plant in Billings owned by its parent, Montana Power Company. That same year, Peabody Coal Company won a contract to supply a Minnesota utility with coal from the Big Sky Mine, also in Rosebud County.

Demand for low sulfur coal to fuel steam-electric generating plants stimulated more strip mine development. Output increased ten-fold between 1970 and 1991 from 3.5 million tons to 38 million tons. Over 75 percent of that increase occurred by 1977. The high point for coal production was 1988; since then, production has decreased slightly.

Current Production

As of 1992, one-quarter of the U.S. demonstrated reserve base of coal is found in Montana. This includes 57 percent of the subbituminous coal and 35 percent of the lignite demonstrated reserve base.

Over 99 percent of Montana production during 1991 was subbituminous coal. That year, Big Horn County led production in Montana, with 20,827,596 tons of coal, while Rosebud County produced 16,907,669 tons. Two companies, Decker Coal Company and Western Energy Company, accounted for two-thirds of Montana's coal production.

Though Montana has large coal reserves, it serves a relatively small fraction of the national market. Montana ranked eighth in U.S. coal production in 1991, providing 3.8 percent of all the coal produced in the nation. This probably is due to a combination of factors that make Montana coal less competitive than coal from other areas, particularly Wyoming, the nation's largest coal producer in 1991. Montana coal generally is more costly to mine than Wyoming coal, because Montana coal seams tend to be thinner and buried deeper than seams in Wyoming. Moreover, Wyoming coal has slightly higher average Btu content and slightly lower average ash and sulfur content than Montana coal.

The cost of transportation to distant midwestern markets may also affect the competitiveness of Montana coal. Railroad coal freight rates are not published, but transportation costs can be roughly estimated by comparing the costs of Montana coal delivered to different destinations. For instance, in 1991, the cost of Rosebud County coal delivered to a mine mouth steam-electric plant was 40 percent of the cost of Rosebud County coal delivered to a Wisconsin electric utility.

The price of coal rose through the middle of the 1980s then declined, with the price in 1991 being almost the same as that in 1980. However, in dollars adjusted for inflation, the price declined by a third over that period. The average mine mouth price of Montana coal in 1991 was $10.76 per short ton, $1.34 higher than the previous year.

In 1991, over 95 percent of Montana coal deliveries to both in-state and out-of-state destinations were to electric utility plants. About 70 percent of Montana coal production was delivered outside Montana, primarily to utilities in Michigan and Minnesota. Nearly all exported coal was shipped eastward on Burlington Northern's northern main line.

Table 3.1. Demonstrated Reserve Base of Coal by State and Rank[1] as of January 1, 1992

Rank	State	Million short tons					Percentage of U.S. TOTAL
		Anthracite	Bituminous	Subbituminous	Lignite	TOTAL	
1	**Montana**		**1,385**	**102,772**	**15,762**	**119,919**	**25.2%**
2	Illinois		78,117			**78,117**	**16.4**
3	Wyoming		4,369	64,929		**69,298**	**14.6**
4	West Virginia		36,787			**36,787**	**7.7**
5	Pennsylvania	7,233	21,956			**29,189**	**6.1**
6	Kentucky		29,077			**29,077**	**6.1**
	Eastern[2]		8,803				
	Western[2]		20,273				
7	Ohio		23,892			**23,892**	**5.0**
8	Colorado	26	8,861	3,880	4,190	**16,956**	**3.6**
9	Texas				13,266	**13,266**	**2.8**
10	Indiana		10,111			**10,111**	**2.1**
11	North Dakota				9,590	**9,590**	**2.0**
12	Alaska		698	5,424	14	**6,136**	**1.3**
13	Utah		6,089	1		**6,090**	**1.3**
14	Missouri		6,001			**6,001**	**1.3**
15	Alabama		3,679		1,083	**4,762**	**1.0**
16	New Mexico	2	1,933	2,495		**4,430**	**0.9**
17	Virginia	126	2,420			**2,546**	**0.5**
18	Iowa		2,190			**2,190**	**0.5**
19	Oklahoma		1,587			**1,587**	**0.3**
20	Washington		304	1,107	8	**1,419**	**0.3**
21	Kansas		977			**977**	**0.2**
22	Tennessee		843			**843**	**0.2**
23	Maryland		750			**750**	**0.2**
24	Louisiana				484	**484**	**0.1**
25	Arkansas	104	288		25	**417**	**0.1**
26	South Dakota				366	**366**	**0.1**
27	Arizona		236			**236**	**0.0**
28	Michigan		128			**128**	**0.0**
29	Oregon			18		**18**	**0.0**
30	North Carolina		11			**11**	**0.0**
31	Idaho		4			**4**	**0.0**
32	Georgia		4			**4**	**0.0**
	U.S. Total	**7,491**	**242,694**	**180,625**	**44,788**	**475,597**	**100.0%**

[1] Includes measured and indicated resource categories as defined by the U.S. Department of Energy and represents 100 percent of the coal in place.

[2] Eastern Kentucky is in the Appalachian coal producing region; western Kentucky is in the U.S. interior coal producing region. Because coal reserves are calculated by region, these figures are shown separately.

NOTE: The coal reserve base consists of coal in the ground that was considered to be technically and economically minable on January 1, 1992. The amount of coal that can be recovered from the reserve base is termed the reserve. Recoverability ranges from 40 to 90 percent, depending on the characteristics of the coalbed, the mining method, and restraints imposed on the mining operations by natural and manmade features and restrictions. On a national basis, at least half of the coal reserve base, more than 200 billion tons, was estimated to be recoverable.

State geological and mineral resource surveys and other geological reports were used to update the U.S. Department of Energy's coal reserve base estimates. Annual updates account for (1) depletion due to mining, (2) revisions based on new data sources determined to be suitable under demonstrated reserve base (DRB) criteria, and (3) adjustments using existing data sources in context with changes in DRB criteria or basic data interpretations.

SOURCE: U.S. Department of Energy, Energy Information Administration, *Coal Production*, annual report for 1991 (EIA-0118).

Table 3.2. U.S. Coal Production by State and Rank, 1991

Rank	State	Million short tons				TOTAL	Percentage of U.S. TOTAL
		Anthracite	Bituminous	Subbituminous	Lignite		
1	Wyoming		2,521	191,333		193,854	19.5%
2	West Virginia		166,935			166,935	16.8
3	Kentucky		158,330			158,330	15.9
4	Pennsylvania	3,009	61,462			64,471	6.5
5	Illinois		60,253			60,253	6.1
6	Texas		332		53,493	53,825	5.4
7	Virginia		41,811			41,811	4.2
8	Montana			37,944	283	38,227	3.8
9	Indiana		31,456			31,456	3.2
10	Ohio		30,460			30,460	3.1
11	North Dakota				29,530	29,530	3.0
12	Alabama		27,167			27,167	2.7
13	Utah		21,945			21,945	2.2
14	New Mexico		10,042	11,476		21,518	2.2
15	Colorado		9,598	8,233		17,831	1.8
16	Arizona		13,203			13,203	1.3
17	Washington		251	4,892		5,143	0.5
18	Tennessee		4,203			4,203	0.4
19	Maryland		3,743			3,743	0.4
20	Louisiana				3,151	3,151	0.3
21	Missouri		2,304			2,304	0.2
22	Oklahoma		1,841			1,841	0.2
23	Alaska			1,436		1,436	0.1
24	Kansas		416			416	0.0
25	Iowa		344			344	0.0
26	California				57	57	0.0
27	Arkansas		34			34	0.0
	U.S. Total	3,009	648,648	255,315	86,514	993,486	100.0

SOURCE: U.S. Department of Energy, Energy Information Administration, *Coal Production*, annual report for 1991 (EIA-0118).

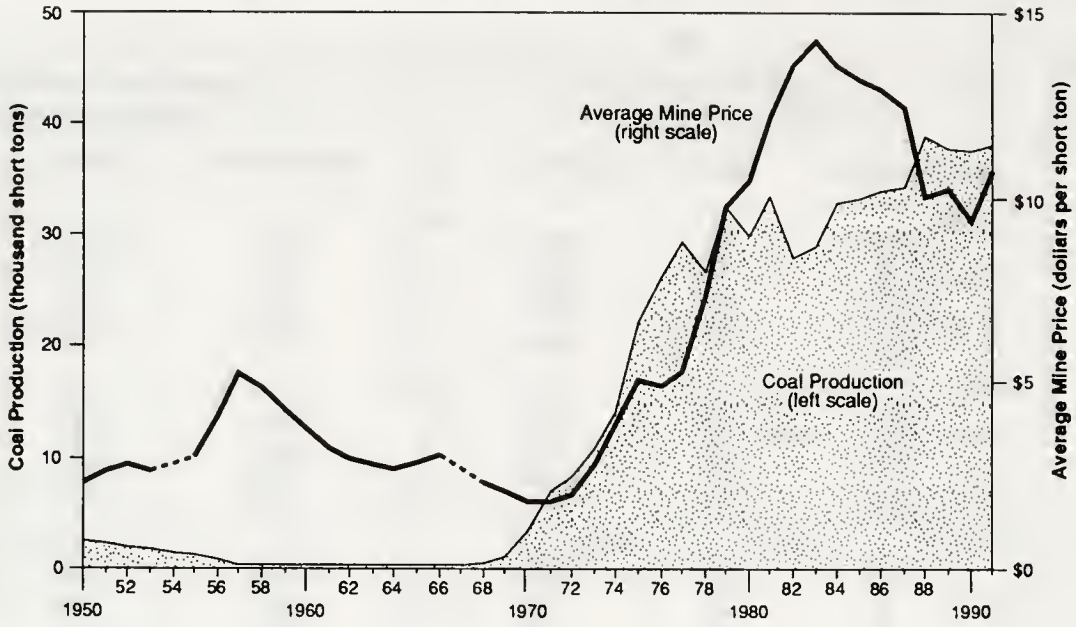
Table 3.3. Coal Production and Average Mine Price by Rank of Coal, 1950-91

Year	PRODUCTION (thousand short tons)			AVERAGE MINE PRICE (dollars per short ton)		
	Subbituminous	Lignite	TOTAL	Subbituminous	Lignite	AVERAGE
1950	2,468	52	2,520	$2.30	$3.37	$2.33
1951	2,310	35	2,345	2.61	3.51	2.63
1952	2,039	31	2,070	2.80	3.70	2.81
1953	1,848	25	1,873	2.64	3.77	2.66
1954	1,491	NA	1,491 E	2.79	NA	NA
1955	1,217	30	1,247	3.01	3.82	3.03
1956	820	26	846	4.11	3.70	4.10
1957	387	26	413	5.33	3.80	5.23
1958	211	94	305	5.94	2.34	4.84
1959	152	193	345	7.06	2.08	4.28
1960	113	200	313	6.87	2.06	3.79
1961	97	274	371	6.76	2.01	3.26
1962	78	304	382	6.90	1.99	2.98
1963	53	290	343	7.51	1.95	2.82
1964	46	300	346	7.40	1.95	2.68
1965	63	301	364	7.24	1.96	2.88
1966	91	328	419	7.10	1.96	3.08
1967	65	300	365	NA	NA	NA
1968	189	330	519	3.12	1.89	2.33
1969	722	308	1,030	2.18	2.03	2.13
1970	3,124	323	3,447	1.83	2.13	1.86
1971	6,737	327	7,064	1.79	2.27	1.82
1972	7,899	322	8,221	2.01	2.45	2.02
1973	10,411	314	10,725	2.83	2.60	2.82
1974	13,775	331	14,106	3.91	3.00	3.90
1975	21,620	520	22,140	5.06	5.04	5.06
1976	25,919	312	26,231	NA	NA	4.90
1977	29,020	300	29,320	NA	NA	5.30
1978	26,290	310	26,600	NA	NA	7.37
1979	32,343	333	32,676	w	w	9.76
1980	29,578	369	29,948	w	w	10.50
1981	33,341	204	33,545	w	w	12.14
1982	27,708	174	27,882	w	w	13.57
1983	28,713	211	28,924	w	w	14.22
1984	32,771	229	33,000	w	w	13.57
1985	33,075	212	33,286	w	w	13.18
1986	33,741	237	33,978	w	w	12.93
1987	34,123	277	34,399	w	w	12.43
1988	38,656	225	38,881	w	w	10.06
1989	37,454	288	37,742	w	w	10.27
1990	37,266	230	37,616[1]	w	w	9.42
1991	37,944	283	38,227	w	w	10.76

NA Not available.
E Estimated value.
w Withheld to avoid disclosure of individual company data.
1 The 1990 total includes 120,000 tons of bituminous coal.

SOURCES: U.S. Bureau of Mines (1950-76); U.S. Department of Energy, Energy Information Administration, (1977-78); U.S. Department of Energy, Energy Information Administration, *Coal Production*, annual reports for 1979-91 (EIA-0118).

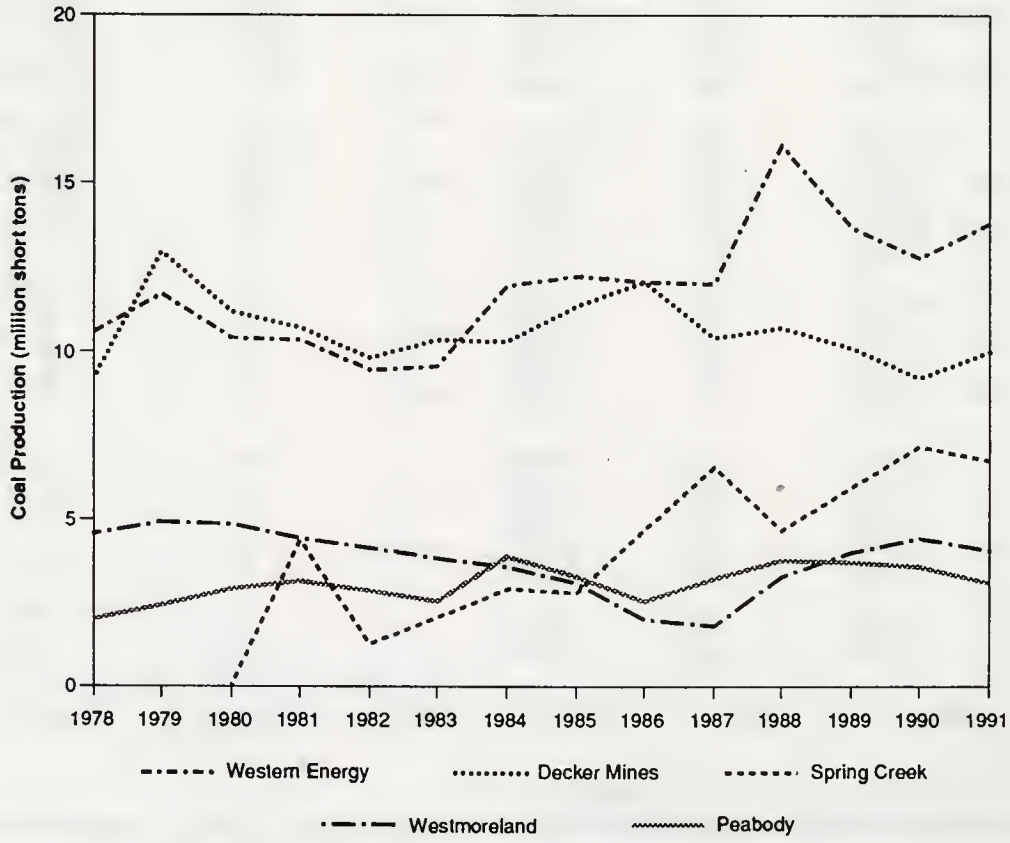
Figure 3.1. Coal Production and Average Mine Price, 1950-91



SOURCE: Table 3.3

Figure 3.2. Coal Production by Company, 1978-91

Principal Montana Mines



SOURCE: Table 3.4

Table 3.4. Coal Production by Company, 1978-91 (short tons)

Company	County	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Beartooth Coal Co.[1]	Carbon		715	7,321											
Coal Creek Mining Co.	Powder River	8,245	29,866	64,398	64,142	16,608									
Decker Coal Co.[2]															
East Decker Mine	Big Horn		5,897,433	5,576,607	5,350,113	4,914,970	5,040,018	5,019,186	5,191,701	5,397,476	4,042,597	3,655,067	3,582,885	2,595,829	2,408,968
West Decker Mine	Big Horn	9,167,638	7,067,372	5,616,695	5,331,626	4,884,920	5,308,799	5,278,365	6,149,987	6,706,592	6,355,523	7,068,653	6,495,027	6,602,744	7,576,380
Knife River Coal Co.[3]	Richland	288,708	305,143	305,578	204,492	171,556	206,543	236,954	212,654	252,754	290,264	227,603	295,089	234,010	282,641
Morrison-Knudsen Co., Inc. (Westmoreland Resources)	Big Horn	4,549,558	4,949,759	4,905,262	4,450,296	4,158,578	3,868,844	3,621,544	3,112,595	2,028,595	1,858,315	3,304,822	4,011,156	4,471,345	4,101,847
P.M. Coal Co.	Musselshell	9,877	10,749	11,189	7,404	15,141	11,655	15,865	21,400	23,915	14,495	15,542	15,760	14,307	12,202
Peabody Coal Co.	Rosebud	2,080,414	2,457,633	2,964,359	3,193,570	2,891,428	2,571,861	3,945,865	3,336,907	2,594,306	3,234,538	3,788,137	3,715,325	3,602,851	3,104,829
Red Lodge Coal Co.	Carbon										900				
Spring Creek Coal Co. (NERCO)	Big Horn			118,660	4,368,885	1,352,181	2,102,606	2,962,008	2,837,037	4,664,238	6,557,228	4,704,442	5,979,405	7,133,285	6,740,401
Storm King Coal Mining Co.[4]	Musselshell	8,984	9,464	8,571	8,165	8,062	5,896	16,379	3,251						
Blaine Warburton (owner)	Blaine									276	305	248	96		
Western Energy Co.	Rosebud	10,565,750	11,725,558	10,401,972	10,352,966	9,424,857	9,544,062	11,957,724	12,275,351	12,074,698	12,022,894	16,155,867	13,677,234	12,800,898	13,802,840
TOTAL		26,679,174	32,453,692	29,980,612	33,331,659	27,838,301	28,660,284	33,053,890	33,140,883	33,742,850	34,377,059	38,920,381	37,771,977	37,455,269	38,030,108

[1] Underground mine.
[2] Production for 1978 is reported as the West Decker Mine.
[3] Lignite mine.
[4] Prior to a change in ownership in June 1983, this was called the Divide Coal Mining Company.

SOURCE: Montana Department of Labor and Industry, Workers' Compensation Division (1978-91).

Table 3.5. Distribution of Coal for Use in Montana, 1974-91 (thousand short tons)

Year	Electric Utilities	Residential and Commercial	Industrial	TOTAL
1974	843	9	55	**907**
1975	1,203	7	42	**1,252**
1976	2,452	5	108	**2,565**
1977	3,225	1	182	**3,408**
1978	3,334	4	183	**3,522**
1979	3,513	3	214	**3,731**
1980	3,462	14	182	**3,658**
1981	3,318	7	253	**3,578**
1982	2,619	9	197	**2,824**
1983	3,058	8	120	**3,186**
1984	4,979	6	153	**5,138**
1985	5,625	8	220	**5,852**
1986	8,094	22	317	**8,433**
1987	7,603	8	180	**7,791**
1988	10,556	9	230	**10,795**
1989	10,242	53	185	**10,480**
1990	9,574	57	252	**9,883**
1991	10,614	45	265	**10,924**

SOURCES: U.S. Department of Interior, Bureau of Mines, Mineral Industry Surveys, *Bituminous Coal and Lignite Distribution*, annual reports for 1974-76; U.S. Department of Energy, Energy Information Administration, *Bituminous Coal and Lignite Distribution*, quarterly reports for 1977; U.S. Department of Energy, Energy Information Administration, *Bituminous Coal and Lignite Distribution*, annual report for 1978 (EIA-0125); U.S. Department fo Energy, Energy Information Administration, *Bituminous and Subbituminous and Lignite Distribution*, annual report for 1979 (EIA- 0125); U.S. Department of Energy, Energy Information Administraiton, *Coal Distribution*, annual reports for 1980-91 (EIA-0125).

Table 3.6. Receipts of Montana Coal at Electric Utility Plants[1], 1973-91 (thousand short tons)

Year	Received at Montana Utilities			Received at Out-of-State Utilities	TOTAL
	Subbituminous	Lignite	Montana Total		
1973			882	9,741	10,623
1974			822	13,114	13,936
1975			1,197	20,180	21,377
1976			2,316	22,642	24,958
1977			3,223	22,730	25,954
1978	3,033	298	3,331	22,976	26,307
1979	3,207	304	3,511	24,613	28,124
1980	3,071	293	3,364	24,561	27,925
1981	3,129	210	3,339	26,634	29,973
1982	2,424	177	2,601	25,439	28,040
1983	1,804	206	2,010	25,756	27,766
1984	4,823	200	5,023	27,432	32,455
1985	5,292	168	5,460	25,975	31,435
1986	7,308	190	7,498	22,992	30,490
1987	7,376	220	7,596	24,607	32,203
1988	10,306	168	10,474	26,076	36,550
1989	9,989	235	10,224	25,858	36,082
1990	9,343	176	9,519	26,108	35,626
1991	10,173	225	10,398	26,091	36,490

1 Plants of 25-megawatt capacity or larger (1973-82); plants of 50-megawatt capacity or larger (1983-91).

SOURCES: Federal Energy Regulatory Commission (formerly the Federal Power Commission), Form 423 (1973-77); U.S. Department of Energy, Energy Information Administration, *Cost and Quality of Fuels for Electric Utility Plants*, annual reports for 1978-91 (EIA-0191).

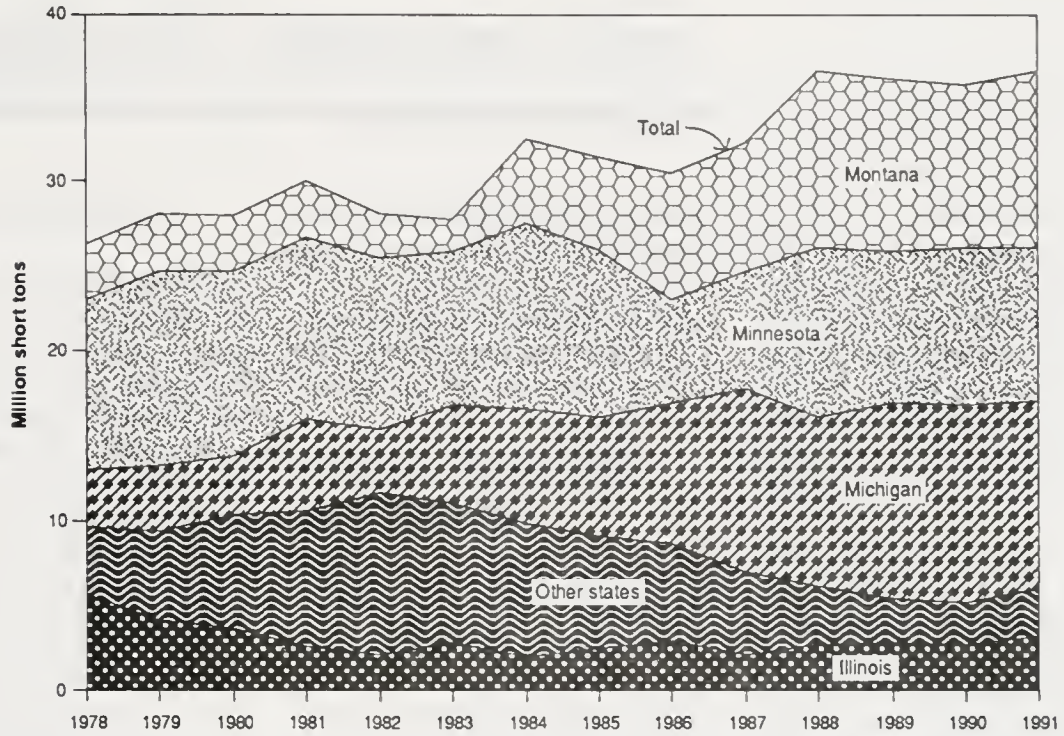
Table 3.7. Destination of Montana Coal Delivered to Steam-Electric Plants[1], 1978-91 (thousand short tons).

State of Destination	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Arizona									20					
Georgia												54		
Illinois	5,688	4,106	3,694	2,669	2,146	2,841	1,999	2,487	3,037	2,076	2,729	2,894	2,726	3,228
Indiana	1,202	813	1,157	735	1,504	1,063	1,318	1,231	1,384	985	466	341	585	725
Iowa	224	180	207	257	213	133					1			
Kansas		6												
Kentucky	50													
Michigan	3,309	3,727	3,426	5,398	3,703	5,700	6,699	6,874	8,163	10,706	9,875	11,425	11,504	11,032
Minnesota	10,007	11,450	10,738	10,664	10,039	9,010	10,869	9,975	6,138	6,889	10,069	8,952	9,309	9,048
Mississippi														105
Montana	**3,331**	**3,511**	**3,364**	**3,339**	**2,601**	**2,010**	**5,023**	**5,460**	**7,498**	**7,596**	**10,474**	**10,224**	**9,519**	**10,398**
Nebraska			41							1				
North Dakota		3												
South Dakota											144			
Texas		1,609	2,723	4,385	5,373	4,595	4,210	3,173	2,178	2,311	569			
Washington											86	55		
Wisconsin	8	2,719	2,575	2,525	2,462	2,414	2,338	2,235	2,073	1,640	2,137	2,137	1,983	1,954
TOTAL	**26,307**	**28,124**	**27,925**	**29,973**	**28,040**	**27,766**	**32,455**	**31,435**	**30,490**	**32,203**	**36,550**	**36,082**	**35,626**	**36,490**

[1] Plants 25-megawatts or greater (1978-82); plants 50-megawatts or greater (1983-91).

SOURCE: U.S. Department of Energy, Energy Information Administration, *Cost and Quality of Fuels for Electric Utility Plants*, annual reports for 1978-91 (EIA-0191).

Figure 3.3. Destination of Montana Coal to Steam-Electric Plants, 1978-91



SOURCE: Table 3.7

Chapter 4: Natural Gas

Production History

Natural gas discoveries in Montana were largely the product of oil exploration in the early 20th century, and were spread throughout the state between 1910 and 1930. During this time, gas was discovered in the Cedar Creek, Bowdoin, and Sweetgrass Hills areas, with minor strikes in the Big Horn Basin and other areas. These were the primary producing areas until 1969, when 9.2 billion cubic feet[1] (Bcf) of associated gas surged from newly discovered Bell Creek oil field in the Powder River Basin. Bell Creek production quickly declined, and the next major gas find was the Tiger Ridge field which yielded 28.4 Bcf in 1973. Tiger Ridge has remained Montana's most productive natural gas area, producing over 13 Bcf of gas in 1991.

Following the 1960s, petroleum supply shocks and the gradual relaxation of gas wellhead price regulation led to dramatic natural gas price increases. In 1972 the average wellhead price was about 12¢ per thousand cubic feet (Mcf). Following the 1973 oil embargo, demand for natural gas increased and gas wellhead prices rose rapidly for 12 years, peaking at $2.46 in 1984. The number of producing wells in the state more than doubled over the same period. Marketed gas production peaked shortly before price, topping at 56.5 Bcf in 1982.

After 1984, wellhead price decreased by about one third to $1.66 per Mcf in 1991. During that period, marketed gas production fluctuated between 46 and 52 Bcf while the number of producing wells remained fairly steady.

Current Production and Reserves

In 1991, Montana's gas wells produced 53 Bcf of gas, 2 percent of which was reinjected into wells, vented or flared.

Sixteen percent of 1991 total production flowed from oil wells (called "associated" gas), with the balance flowing from gas wells (called "nonassociated" gas). Most nonassociated gas production occurred in and around the Tiger Ridge, Cut Bank and Bowdoin fields. Williston Basin and the Cedar Creek Anticline were the leading associated gas producing areas.

Montana's 1991 proved reserves of natural gas and natural gas liquids amounted to 848 Bcf, down about 19 Bcf, or 8 percent, from the previous year. Over 92 percent of reserves were nonassociated natural gas.

Consumption

Natural gas consumption climbed steeply from the early 1950s to peak in 1973, with industrial loads accounting for 40 to 50 percent of total consumption. Most of the growth corresponds with Anaconda Copper Company smelter operations after open pit mining began at the Berkeley Pit in 1953. A sizable decrease in gas consumption in 1967 and 1968 can be attributed to a lengthy strike against Anaconda Copper Company.

Industrial gas consumption decreased dramatically from the early 1970s to the present. Rising gas prices prompted industrial customers to conserve or to switch to alternative fuels such as coal. Plant closures further reduced demand. Following the shutdown of the smelter in Anaconda in 1981, total gas consumption plunged to a 25 year low in 1987.

Residential and commercial consumption also fell following peaks in the early 1970s, as rising prices stimulated gas conservation measures in both sectors. Some residential customers installed supplementary wood heating systems.

Prices

In 1991, residential gas customers paid an average $4.52 per Mcf. Commercial customers paid an average $4.35, and industrial customers paid an average $3.22. The average price of gas to all customers was $4.16 per Mcf, 2 percent less than the previous year.

---

1 Natural gas is measured either volumetrically or calorimetrically. The volumetric units commonly used in the United States are cubic feet, where "Mcf" means thousand cubic feet and "Bcf" means billion cubic feet. One standard Mcf of natural gas at 1 atmosphere (or standard sea level) pressure at 60 degrees Fahrenheit yields about 1.1 million British thermal units (MMBtu). The heating value of natural gas is related inversely to the atmospheric pressure at the burner tip, thus the higher the altitude, the less heating value per Mcf. A typical Mcf sold in Montana has slightly over 0.9 million Btu. A typical Montana household uses 2 to 4 Mcf of gas per month for domestic water heating.

Gas utilities reported natural gas deliveries of 35.7 Bcf to customers in Montana in 1991, an increase of 1.2 percent over the previous year. Over 82 percent of these deliveries went to residential and commercial customers. Average residential gas consumption was 104 Mcf at an average total cost of $468.

Anticipated Changes

Consumption is likely to increase in the future. Recent developments in gas wellhead price deregulation and pipeline industry restructuring are expected to result in relatively low gas prices, especially for large volume customers. Residential consumption is expected to grow as natural gas distribution companies expand gas service areas in coming years. Where it is available, natural gas is currently the most favored fuel for space heating in new construction.

Table 4.1. Year-end Proved Reserves of Natural Gas, 1950-79 (thousand cubic feet)

Year	Nonassociated Natural Gas	Associated-Dissolved Natural Gas	Underground Storage	Total Natural Gas
1950	718,722	69,839	4,470	**793,031**
1951	696,554	119,533	7,522	**823,609**
1952	693,916	119,631	9,562	**823,109**
1953	612,965	117,937	28,949	**759,851**
1954	573,496	116,183	30,122	**719,801**
1955	560,565	125,067	30,178	**715,810**
1956	546,049	115,906	30,614	**692,569**
1957	512,583	119,311	34,914	**666,808**
1958	508,851	132,295	37,163	**678,309**
1959	492,162	128,880	40,835	**661,877**
1960	462,532	105,362	54,883	**622,777**
1961	435,178	104,319	53,601	**593,098**
1962	419,128	98,958	82,085	**600,171**
1963	399,266	103,558	95,307	**598,131**
1964	384,278	99,287	106,704	**590,269**
1965	373,440	103,672	118,740	**595,852**
1966	383,346	102,239	134,765	**620,350**
1967	550,681	138,454	148,583	**837,718**
1968	579,572	174,266	157,695	**911,533**
1969	799,770	147,927	162,511	**1,110,208**
1970	793,283	141,854	164,786	**1,099,923**
1971	715,195	127,032	182,334	**1,024,561**
1972	790,660	92,628	180,748	**1,064,036**
1973	821,513	85,625	185,311	**1,092,449**
1974	676,749	81,272	143,239	**901,260**
1975	686,350	73,912	169,724	**929,986**
1976	876,452	67,435	162,383	**1,106,270**
1977	815,862	67,428	160,692	**1,043,982**
1978	768,683	65,779	157,206	**991,668**
1979	807,645	63,483	164,963	**1,036,091**

NOTE: Proved reserves are the estimated amounts of natural gas that geologic and engineering data indicate are recoverable from known reservoirs under present economic and operating conditions. Natural gas is classified into two categories based on type of occurrence in reservoirs, as follows:

1. Nonassociated gas is defined as free natural gas not in contact with crude oil in the reservoir.

2. Associated or dissolved gas is the combined volume of natural gas that occurs in crude oil reservoirs either as free gas (associated) or as gas in solution with the crude oil (dissolved).

Since 1973, only the recoverable portion of natural gas in underground storage has been reported.

Joint American Gas Association, Canadian Petroleum Association, and American Petroleum Institute publication of the yearly reserves of natural gas and natural gas liquids ceased after 1979. Rather than develop independent reserve estimates, these organizations now publish the reserve estimates calculated by the U.S. Department of Energy, which are shown in Table 4.2.

SOURCE: American Gas Association, *Gas Facts* (1950-79).

Table 4.2. Year-end Proved Reserves of Natural Gas and Natural Gas Liquids, 1976-91

Year	Natural Gas Liquids (MMbbl)	Total Dry Natural Gas[1,2] (Bcf)	Wet After Lease Separation		
			Nonassociated Natural Gas[3] (Bcf)	Associated–Dissolved Natural Gas[3] (Bcf)	Total Natural Gas[2] (Bcf)
1976		806	761	45	
1977		887 E	838	49	887
1978	12	926	893	33	926
1979	10	825	786	51	837
1980	16	1,287 E	1,186	122	1,308 E
1981	11	1,321 E	1,247	89	1,336 E
1982	18	847	789	81	870
1983	19	896	813	108	921
1984	18	802	748	77	825
1985	21	857	793	91	884
1986	16	803	725	98	823
1987	16	780	704	97	801
1988	11	819	733	101	834
1989	16	867	821	68	889
1990	15	899	834	86	920
1991	14	831	782	66	848

E The number shown is associated with a standard error (95 percent confidence interval) that exceeds 20 percent of the estimated value.

1 The volume of natural gas remaining after removal of all liquids and nonhydrocarbon gases.

2 Volumes for 1977 and 1978 were neither fully dry nor fully wet.

3 Reported on a dry basis prior to 1979.

SOURCES: U.S. Department of Energy, Energy Information Administration, *U.S. Crude Oil and Natural Gas Reserves*, annual reports for 1977-78 (EIA-0216); U.S. Department of Energy, Energy Information Administration, *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, annual reports for 1979-91 (EIA-0216).

Table 4.3. Natural Gas Production and Average Wellhead Price, 1950-91

Year	Federal Statistics[1]				DOR Statistics[2]		
	Gross Withdrawal[3] (MMcf)	Marketed Production[4] (MMcf)	Average[5] Wellhead Price ($ per Mcf)	Gross Value[6] of Montana Production (thousand $)	Production Taxed by the State (MMcf)	Average[6] Wellhead Price ($ per Mcf)	Gross Value[7] of Montana Production (thousand $)
1950	40,975	38,972	$0.053	$2,066	39,010	$0.050	$1,951
1951	36,897	36,225	0.055	1,992	36,123	0.053	1,915
1952	29,140	28,557	0.061	1,742	27,939	0.057	1,593
1953	28,245	27,736	0.059	1,636	28,592	0.063	1,801
1954	30,532	30,087	0.068	2,046	29,765	0.060	1,786
1955	28,841	28,100	0.067	1,883	30,227	0.052	1,572
1956	26,852	25,706	0.068	1,748	28,350	0.061	1,729
1957	30,830	28,481	0.072	2,051	31,413	0.060	1,885
1958	30,830	27,836	0.068	1,893	27,689	0.065	1,800
1959	32,819	30,575	0.075	2,293	30,551	0.060	1,833
1960	37,792	33,235	0.071	2,360	30,411	0.068	2,068
1961	36,798	33,716	0.074	2,495	32,407	0.064	2,074
1962	32,621	29,791	0.074	2,205	29,417	0.061	1,794
1963	31,228	29,862	0.075	2,240	25,504	0.066	1,683
1964	26,653	25,050	0.078	1,954	23,592	0.066	1,557
1965	29,800	28,105	0.082	2,305	26,285	0.065	1,709
1966	36,048	30,685	0.083	2,547	29,041	0.081	2,352
1967	31,610	25,866	0.084	2,173	29,276	0.079	2,313
1968	32,229	19,313	0.091	1,757	28,831	0.088	2,537
1969	68,064	41,229	0.102	4,205	37,804	0.072	2,722
1970	48,302	42,705	0.103	4,399	35,225	0.081	2,853
1971	38,136	32,720	0.121	3,959	28,775	0.082	2,360
1972	38,137	33,474	0.123	4,117	32,171	0.100	3,217
1973	60,931	56,175	0.236	13,257	56,383	0.159	8,965
1974	59,524	54,873	0.253	13,883	41,753	0.252	10,522
1975	44,547	40,734	0.433	17,638	41,664	0.394	16,416
1976	45,097	42,563	0.445	18,941	42,449	0.440	18,678
1977	48,181	46,819	0.719	33,663	45,245	0.720	32,576
1978	48,497	46,522	0.847	39,404	46,759	0.837	39,137
1979	56,094	53,888	1.211	65,258	54,969	1.202	66,073
1980	53,802	51,867	1.454	75,415	53,520	1.436	76,855
1981	58,502	56,565	1.909	107,983	48,654	1.900	92,443
1982	58,184	56,517	2.145	121,229	48,338	2.102	101,606
1983	53,516	51,967	2.410	125,240	46,423	2.403	111,554
1984	52,930	51,474	2.460	126,626	48,500	2.494	120,959
1985	54,151	52,494	2.390	125,461	45,872	2.329	106,836
1986	48,246	46,592	2.050	95,514	42,216	2.153	90,891
1987	47,845	46,456	1.800	83,621	42,021	1.781	74,839
1988	53,014	51,654	1.700	87,812	42,870	1.738	74,508
1989	52,583	51,307	1.550	79,526	44,883	1.685	75,646
1990	51,537	50,429	1.790	90,268	36,492	1.884	68,751
1991	53,003	51,999	1.660	86,318	41,932	1.671	70,065

[1] SOURCES: U.S. Department of Interior, Bureau of Mines, Mineral Industry Surveys, *Natural Gas Production and Consumption*, annual reports for 1950-75; U.S. Department of Energy, Energy Information Administration, *Natural Gas Production and Consumption*, annual reports for 1976-79 (EIA-0131); U.S. Department of Energy, Energy Information Administration, *Natural Gas Annual*, annual reports for 1980-91 (EIA-0131).

[2] SOURCE: Montana Department of Revenue, Property Assessment Division (1950-81); Montana Department of Revenue, Research and Information Division (1982-91). Department of Revenue data are based on tax receipts received from industry. Not all gas is taxed.

[3] Gross Withdrawal includes marketed production, plus quantities used in repressuring, plus quantities vented and flared from both gas wells and oil wells.

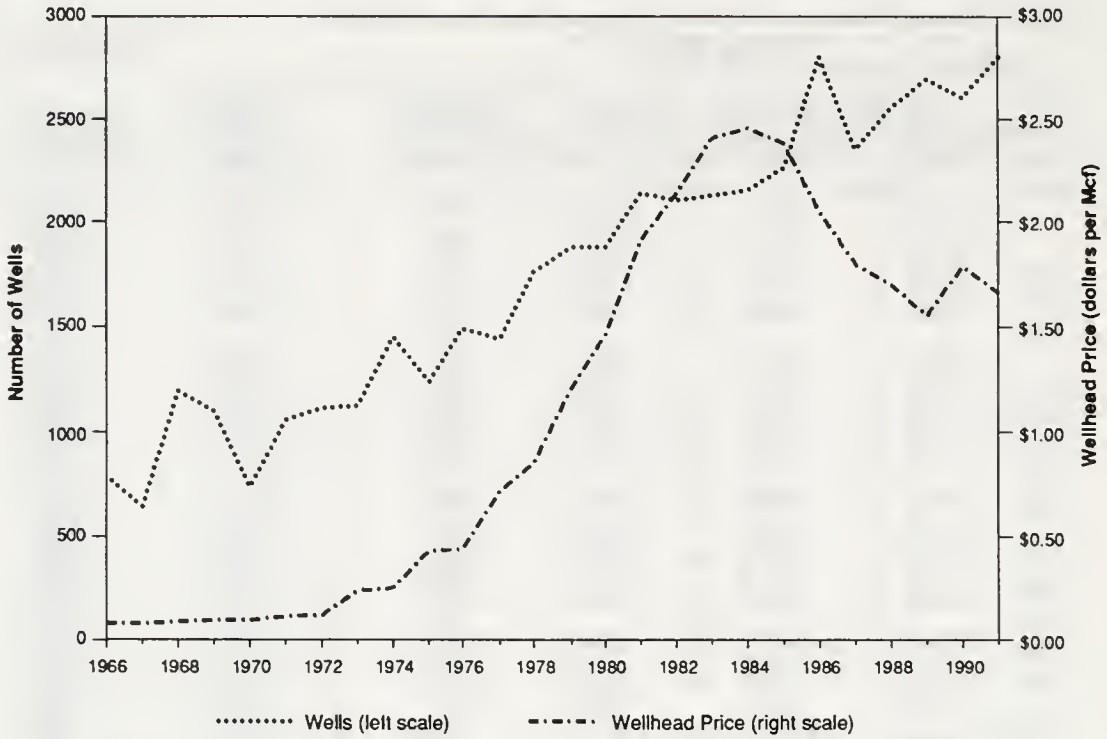
[4] Marketed Production represents gross withdrawals of natural gas from gas and oil wells minus gas used for repressuring, nonhydrocarbon gases removed, and quantities vented and flared. (For 1979 and prior years, the volumes of nonhydrocarbon gases included in marketed production were not reported. For 1980 and 1981, the amount of nonhydrocarbon gases removed was not available for the Montana data, so the Department of Energy used the same figure for Montana's marketed production including nonhydrocarbon gases as is used for marketed production excluding nonhydrocarbon gases.)

[5] Average wellhead price is computed by dividing the gross value of the gas produced by the respective volume produced.

[6] Aggregate value of marketed production.

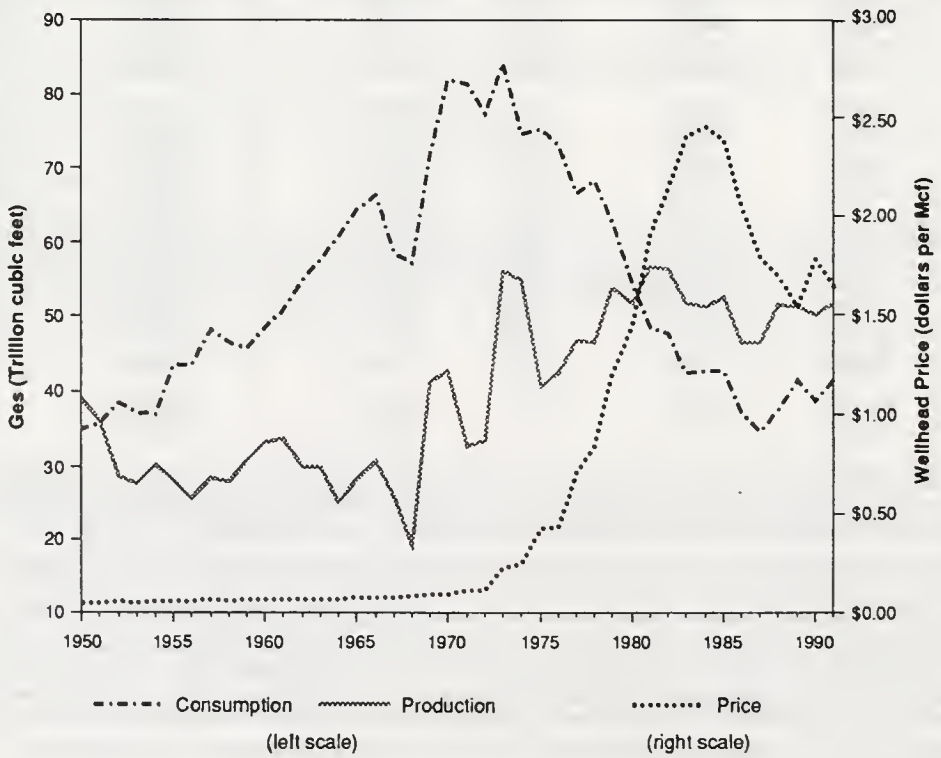
[7] Aggregate value of taxed production.

Figure 4.1. Number of Producing Gas and Gas Condensate Wells and Average Wellhead Price, 1966-91



SOURCES: Number of Wells: Table 4.4
Wellhead Price: Table 4.3 (Federal Statistics)

Figure 4.2. Natural Gas Production, Consumption and Average Wellhead Price, 1950-91



SOURCES: Production: Table 4.3 (Marketed Production)
Consumption: Table 4.5 (Subtotal of Gas Deliveries by Customer Type)
Wellhead Price: Table 4.3 (Federal Statistics)

Table 4.4. Number of Producing Gas and Gas Condensate Wells, and Number of Gas Wells Drilled, 1966-91

Year	Number of Gas Wells			
	Producing	Drilled[1]		
		Development	Exploratory	TOTAL
1966	784	9	3	12
1967	648	14	5	19
1968	1,196	14	13	27
1969	1,098	44	5	49
1970	739	30	11	41
1971	1,056	36	22	58
1972	1,116	97	19	116
1973	1,118	165	36	201
1974	1,450	179	21	200
1975	1,235	261	15	276
1976	1,490	264	8	272
1977	1,438	220	19	239
1978	1,755	223	15	238
1979	1,881	235	20	255
1980	1,881	203	12	215
1981	2,140	133	85	218
1982	2,111	145	46	191
1983	2,133	55	16	71
1984	2,153	99	21	120
1985	2,260	84	2	86
1986	2,799	81	10	91
1987	2,349	75	9	84
1988	2,553	54	19	73
1989	2,700	115	12	127
1990	2,607	180	12	192
1991	2,802	140	17	157

[1] Does not include dry holes drilled in search of natural gas. Dry holes are included in Table 5.3, which compiles all oil and gas wells drilled.

SOURCES:

Producing: U.S. Department of Interior, Bureau of Mines, Mineral Industry Surveys, *Natural Gas Production and Consumption*, annual reports for 1966-75; U.S. Department of Energy, Energy Information Administration, *Natural Gas Production and Consumption*, annual reports for 1976-79 (EIA-0131); U.S. Department of Energy, Energy Information Administration, *Natural Gas Annual*, annual reports for 1980-91 (EIA-0131).

Drilled: Montana Department of Natural Resources and Conservation, Oil and Gas Division, *Annual Review*, 1966-91.

Table 4.5. Natural Gas Consumption by Customer Class, 1950-91 (million cubic feet)

Year	Gas Deliveries by Customer Class[1]					Total[4] Consumption
	Residential	Commercial[2]	Industrial[3]	Electric Utilities	Subtotal	
1950	12,596	7,536	13,979	892	35,002	38,333
1951	12,287	7,379	15,047	884	35,598	37,276
1952	12,263	7,794	17,422	998	38,476	41,545
1953	12,029	7,544	16,559	1,237	37,368	40,953
1954	13,314	8,277	14,909	601	37,101	41,002
1955	15,335	9,427	18,240	630	43,631	47,861
1956	15,235	9,314	18,226	876	43,651	48,305
1957	16,725	10,116	18,429	2,954	48,224	54,868
1958	14,970	9,546	18,960	3,183	46,659	54,725
1959	17,310	11,124	16,438	1,005	45,877	51,898
1960	16,825	11,820	19,558	339	48,543	54,271
1961	17,086	12,140	21,404	354	50,985	57,465
1962	17,078	12,302	21,713	3,692	54,785	62,952
1963	17,274	12,569	24,613	3,285	57,740	66,969
1964	18,792	13,059	26,419	2,437	60,706	67,282
1965	19,908	14,110	28,310	1,992	64,320	70,895
1966	19,690	14,068	29,571	2,977	66,306	73,829
1967	19,756	15,516	22,584	502	58,358	65,782
1968	19,711	13,651	23,155	631	57,148	63,642
1969	21,463	16,593	31,917	1,520	71,493	78,988
1970	24,794	18,564	36,105	2,529	81,992	90,823
1971	25,379	18,109	36,800	1,075	81,363	89,021
1972	23,787	19,151	33,192	1,218	77,348	85,161
1973	24,923	19,143	37,898	2,322	84,286	91,148
1974	21,590	16,602	35,202	1,111	74,505	80,766
1975	24,097	18,654	31,631	1,059	75,441	80,351
1976	23,525	17,831	31,049	709	73,114	78,094
1977	21,596	16,706	27,260	953	66,515	70,956
1978	22,944	17,766	26,686	909	68,305	72,649
1979	22,579	17,396	20,411	2,320	62,706	69,805
1980	19,296	14,265	16,717	4,182	54,460	60,724
1981	17,245	13,725	15,494	2,069	48,533	52,452
1982	19,989	15,987	11,574	337	47,887	52,208
1983	16,967	13,534	11,798	335	42,634	46,249
1984	18,443	14,256	9,855	360	42,914	46,864
1985	19,371	14,820	8,220	468	42,879	47,265
1986	16,822	12,536	7,507	407	37,272	41,148
1987	15,359	10,989	7,861	478	34,687	38,786
1988	16,900	12,041	8,360	286	37,587	41,825
1989	18,195	13,141	9,903	336	41,575	45,756
1990	16,850	12,164	9,424	418	38,856	43,169
1991	18,413	12,848	9,873	268	41,401	45,402

[1] Other consumers, including deliveries to municipalities and public authorities for institutional heating, street lighting, etc., were included in the Industrial category prior to 1967. From 1967 on, other consumers were included in the Commercial category.

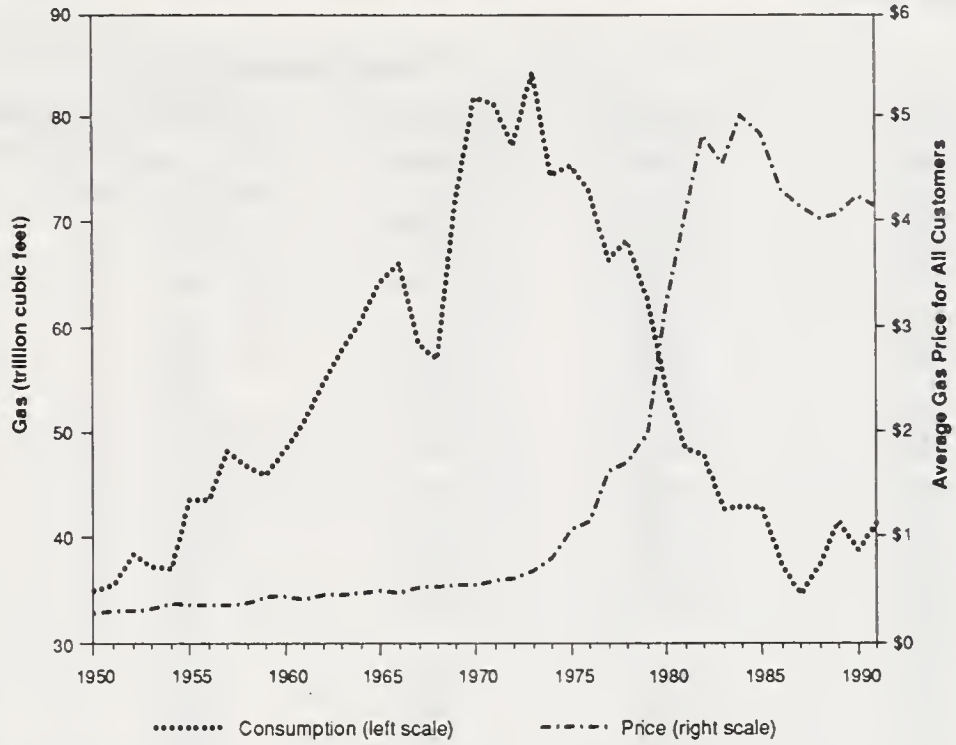
[2] Beginning with 1990 data, Commercial volumes include natural gas delivered for vehicular fuel use.

[3] Industrial use includes refinery use of gas, but excludes pipeline fuel.

[4] Total Consumption includes total gas delivered to consumers, plus lease and plant fuel, plus pipeline fuel.

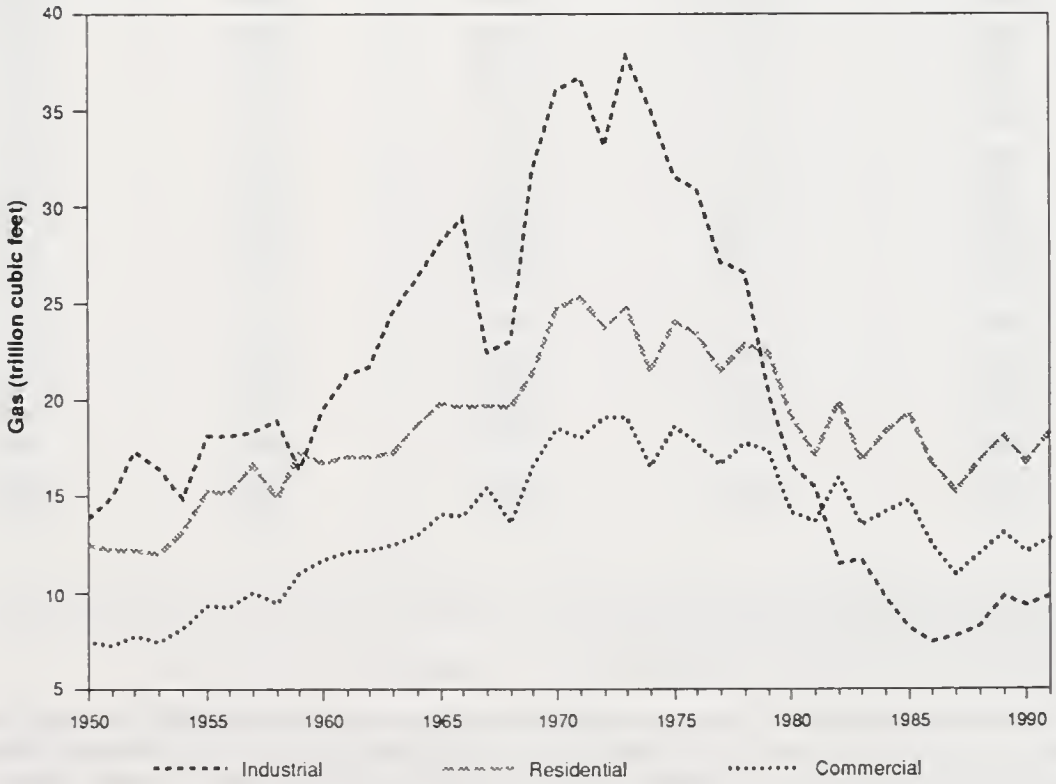
SOURCES: U.S. Department of Interior, Bureau of Mines, Mineral Industry Surveys, *Natural Gas Production and Consumption*, annual reports for 1950-75; U.S. Department of Energy, Energy Information Administration, *Natural Gas Production and Consumption*, annual reports for 1976-79 (EIA-0131); U.S. Department of Energy, Energy Information Administration, *Natural Gas Annual*, annual reports for 1980-91 (EIA-0131).

Figure 4.3. Natural Gas Consumption and Price for All Customers, 1950-91



SOURCES: Consumption: Table 4.5
Price: Table 4.6

Figure 4.4. Natural Gas Consumption by Customer Class, 1950-91



SOURCE: Table 4.5

Table 4.6. Average Natural Gas Prices by Customer Class[1], 1950-91 (dollars per thousand cubic feet)

Year	Price by Customer Class			
	Residential	Commercial	Industrial	All Customers[2]
1950	$0.473	$0.328	$0.142	$0.301
1951	0.510	0.351	0.160	0.320
1952	0.507	0.352	0.192	0.324
1953	0.531	0.368	0.194	0.337
1954	0.589	0.415	0.201	0.388
1955	0.583	0.411	0.202	0.380
1956	0.585	0.412	0.206	0.382
1957	0.583	0.413	0.208	0.380
1958	0.647	0.443	0.218	0.401
1959	0.647	0.457	0.267	0.456
1960	0.660	0.464	0.274	0.454
1961	0.655	0.459	0.257	0.438
1962	0.752	0.506	0.251	0.464
1963	0.746	0.507	0.268	0.462
1964	0.763	0.533	0.303	0.495
1965	0.781	0.541	0.311	0.506
1966	0.779	0.543	0.304	0.495
1967	0.796	0.571	0.341	0.546
1968	0.822	0.603	0.326	0.554
1969	0.882	0.643	0.338	0.562
1970	0.907	0.659	0.339	0.572
1971	0.934	0.685	0.357	0.603
1972	0.965	0.691	0.381	0.630
1973	1.086	0.804	0.425	0.698
1974	1.119	0.926	0.580	0.804
1975	1.296	1.101	0.949	1.089
1976	1.364	1.187	0.930	1.164
1977	1.816	1.584	1.558	1.641
1978	1.894	1.646	1.642	1.720
1979	2.213	2.002	1.749	2.004
1980	3.053	3.117	3.143	3.182
1981	3.754	4.138	4.258	4.057
1982	4.460	4.874	5.488	4.829
1983	4.627	5.065	3.990	4.561
1984	4.861	5.242	5.173	5.025
1985	4.813	5.094	4.706	4.845
1986	4.446	4.476	3.913	4.312
1987	4.410	4.340	3.420	4.160
1988	4.300	4.300	3.080	4.040
1989	4.370	4.360	2.980	4.080
1990	4.590	4.640	3.270	4.260
1991	4.520	4.350	3.220	4.160

[1] Average prices were computed by dividing the annual value of natural gas consumed by a customer class by the respective annual volume of natural gas consumed.

[2] The All Customers category includes electric utilities and other consumers as shown in Table 4.5.

SOURCES: U.S. Department of the Interior, Bureau of Mines, Mineral Industry Surveys, *Natural Gas Production and Consumption*, annual reports for 1950-75; U.S. Department of Energy, Energy Information Administration, *Natural Gas Production and Consumption*, annual reports for 1976-79 (EIA-0131); U.S. Department of Energy, Energy Information Administration, *Natural Gas Annual*, annual reports for 1980-91 (EIA-0131).

Table 4.7. Average Natural Gas Consumption and Annual Cost per Consumer, 1980-91

Year	Residential		Commercial		Industrial[1]	
	Average Consumption (Mcf)	Average Annual Cost	Average Consumption (Mcf)	Average Annual Cost	Average Consumption (Mcf)	Average Annual Cost
1980	117	$356	670	$2,089	32,841	$103,218
1981	104	389	610	2,523	31,364	133,551
1982	121	538	780	3,800	24,013	131,770
1983	102	470	651	3,298	25,048	99,956
1984	110	534	679	3,558	21,013	108,703
1985	115	555	706	3,595	17,908	84,267
1986	100	445	597	2,672	16,869	66,006
1987	91	404	514	2,231	18,072	61,806 E
1988	98	423	541	2,329	19,219	59,195 E
1989	106	464	591	2,579	23,138	68,951 E
1990	97	444	521	2,419	20,622	67,434 E
1991	104	468	554	2,411	21,842	70,331 E

E Estimate

1 Beginning in 1987, industrial costs per consumer are estimated by DNRC using Department of Energy average prices of deliveries to industrial customers times industrial consumption volumes. The Department of Energy did not calculate these numbers in national statistics because values associated with gas delivered for the account of others are not always available. However, those values are not considered to be significant in Montana.

SOURCE: U.S. Department of Energy, Energy Information Administration, *Natural Gas Annual*, annual reports for 1980-91 (EIA-0131).

Table 4.8. Sales[1] of Natural Gas by Gas Utilities,* 1950-91 (million cubic feet)

Year	MONTANA POWER COMPANY[2]					MONTANA-DAKOTA UTILITIES[3]				
	Residential and Commercial	Industrial	Other	Total	% of Total Montana Sales	Residential and Commercial	Industrial	Other	Total	% of Total Montana Sales
1950	7,909	8,852	NA	16,761	54.2%	4,228	240	469	4,937	16.0%
1951	8,076	12,970	NA	21,046	59.3	5,514	1,180	499	7,193	20.3
1952	8,435	13,760	NA	22,195	62.0	7,340	1,845	468	9,653	26.9
1953	8,229	13,624	NA	21,853	61.9	7,223	1,863	480	9,566	27.1
1954	8,737	12,225	NA	20,962	59.3	7,912	1,649	495	10,056	28.4
1955	11,231	15,511	NA	26,742	63.9	7,594	1,996	533	10,123	24.2
1956	11,100	15,584	NA	26,684	63.4	7,708	2,212	509	10,429	24.8
1957	12,584	15,527	NA	28,111	64.4	7,797	2,056	492	10,345	23.7
1958	12,391	15,173	NA	27,564	62.7	7,429	3,233	551	11,213	25.5
1959	14,401	12,629	NA	27,030	59.6	8,678	2,934	507	12,119	26.7
1960	14,533	15,462	NA	29,995	62.3	8,516	3,148	342	12,006	25.0
1961	14,517	16,654	NA	31,171	62.7	8,689	3,606	177	12,472	25.1
1962	15,133	18,080	NA	33,213	64.1	9,148	3,051	103	12,302	23.7
1963	14,893	19,666	NA	34,559	64.6	8,826	3,862	79	12,767	23.9
1964	16,853	20,958	NA	37,811	64.1	9,620	4,687	55	14,362	24.4
1965	17,977	22,195	NA	40,172	63.9	10,955	4,430	61	15,446	24.6
1966	17,731	23,058	NA	40,789	65.2	10,414	4,256	55	14,725	23.5
1967	18,027	20,766	NA	38,793	64.5	10,584	3,813	67	14,464	24.0
1968	19,063	21,650	NA	40,713	64.6	10,847	4,523	65	15,435	24.5
1969	19,891	25,536	NA	45,427	64.2	11,534	6,277	55	17,866	25.3
1970	20,398	26,006	NA	46,404	62.9	11,499	8,582	102	20,183	27.3
1971	18,956	25,581	1,628	46,165	62.9	11,612	8,317	139	20,068	27.3
1972	20,068	26,128	1,491	47,687	62.4	12,352	8,218	600	21,170	27.7
1973	19,771	25,915	1,578	47,264	62.3	11,525	8,685	1,415	21,623	28.5
1974	18,931	26,301	1,408	46,640	63.4	11,230	8,455	588	20,273	27.6
1975	20,762	24,130	1,523	46,415	62.5	12,779	7,774	NA	20,553	27.7
1976	18,795	20,663	1,405	40,863	61.0	12,208	7,100	NA	19,307	28.8
1977	18,413	18,101	1,451	37,965	61.4	11,898	5,923	NA	17,821	28.8
1978	18,696	17,280	1,498	37,475	60.5	13,784	3,981	NA	17,765	28.7
1979	19,142	16,118	2,737	37,997	62.0	13,500	3,480	NA	16,981	27.7
1980	17,091	12,655	4,986	34,733	62.9	11,332	3,627	NA	14,959	27.1
1981	15,216	9,758	2,754	27,727	57.8	10,312	5,307	NA	15,618	32.6
1982	17,032	7,064	1,317	25,413	54.6	12,228	4,148	60	16,436	35.3
1983	14,606	6,829	1,152	22,587	54.8	10,181	3,774	32	13,987	34.0
1984	16,075	5,967	1,238	23,280	56.3	10,744	2,451	59	13,254	32.1
1985	16,916	6,043	1,271	24,230	58.3	11,094	1,336	19	12,449	29.9
1986	14,461	5,208	1,099	20,768	58.6	9,191	607	15	9,813	27.7
1987	14,090	5,358	748	20,196	62.6	7,712	254	15	7,981	24.7
1988	15,027	6,652	732	22,410	63.3	8,285	475	17	8,776	24.8
1989	16,771	7,050	771	24,592	64.0	9,069	161	17	9,247	24.1
1990	15,915	6,057	744	22,715	64.5	8,192	54	17	8,262	23.5
1991	16,522	4,980	683	22,185	62.2	9,074	12	11	9,096	25.5

Table 4.8 (continued)

Year	GREAT FALLS GAS COMPANY[4]					OTHER UTILITIES[5]		TOTAL SALES[6]			
	Residential and Commercial	Industrial	Other	Total	% of Total Montana Sales	Total for all Sectors	% of Total Montana Sales	Residential and Commercial	Industrial	Other	TOTAL
1950	2,509	208	53	2,770	9.0%	6,481	20.9%	21,127	9,300	522	30,949
1951	2,697	311	191	3,199	9.0	4,055	11.4	20,342	14,461	690	35,493
1952	2,566	228	333	3,127	8.7	852	2.4	19,193	15,833	801	35,827
1953	2,478	238	350	3,066	8.7	814	2.3	18,744	15,725	830	35,299
1954	2,795	255	400	3,450	9.8	892	2.5	20,336	14,129	895	35,360
1955	3,284	243	434	3,961	9.5	1,049	2.5	23,158	17,750	967	41,875
1956	3,361	204	396	3,961	9.4	1,019	2.4	23,188	18,000	905	42,093
1957	3,510	258	451	4,219	9.7	955	2.2	24,846	17,841	943	43,630
1958	3,365	268	475	4,108	9.3	1,067	2.4	24,252	18,674	1,026	43,952
1959	4,048	388	566	5,002	11.0	1,175	2.6	28,302	15,951	1,073	45,326
1960	3,928	512	516	4,956	10.3	1,152	2.4	28,129	19,122	858	48,109
1961	4,067	380	606	5,053	10.2	1,045	2.1	28,318	20,640	783	49,741
1962	4,092	371	752	5,215	10.1	1,078	2.1	29,451	21,502	855	51,808
1963	4,030	396	793	5,219	9.8	945	1.8	28,694	23,924	872	53,490
1964	4,446	480	847	5,773	9.8	1,018	1.7	31,937	26,125	902	58,964
1965	4,767	499	868	6,134	9.8	1,160	1.8	34,859	27,124	929	62,912
1966	4,593	490	846	5,929	9.5	1,125	1.8	33,863	27,804	901	62,568
1967	4,505	397	856	5,758	9.6	1,160	1.9	34,276	24,976	923	60,175
1968	4,504	424	852	5,780	9.2	1,074	1.7	35,488	26,597	917	63,002
1969	5,042	412	891	6,345	9.0	1,118	1.6	37,585	32,225	946	70,756
1970	4,926	378	902	6,206	8.4	1,010	1.4	37,833	34,966	1,004	73,803
1971	4,901	367	895	6,163	8.4	1,048	1.4	36,517	34,265	2,662	73,444
1972	5,185	353	884	6,422	8.4	1,105	1.4	38,710	34,699	2,975	76,384
1973	4,729	414	864	6,007	7.9	982	1.3	37,007	35,014	3,857	75,876
1974	4,504	412	807	5,723	7.8	936	1.3	35,601	35,168	2,803	73,572
1975	5,145	354	845	6,344	8.5	1,000	1.3	39,686	32,258	2,368	74,312
1976	4,875	237	892	6,004	9.0	762	1.1	36,640	28,000	2,297	66,936
1977	4,317	246	734	5,297	8.6	715	1.2	35,343	24,270	2,185	61,798
1978	4,818	196	826	5,840	9.4	824	1.3	38,122	21,457	2,324	61,904
1979	4,512	249	750	5,512	9.0	804	1.3	37,958	19,847	3,487	61,294
1980	3,888	266	689	4,842	8.8	669	1.2	32,980	16,548	5,675	55,203
1981	3,257	169	619	4,044	8.4	573	1.2	29,358	15,234	3,373	47,962
1982	3,289	188	627	4,104	8.8	596	1.3	33,145	11,460	1,944	46,549
1983	3,320	206	636	4,162	10.1	446	1.1	28,553	10,809	1,820	41,182
1984	3,531	256	530	4,317	10.4	487	1.2	30,837	8,674	1,827	41,338
1985	3,719	181	536	4,436	10.7	474	1.1	32,203	7,560	1,826	41,589
1986	3,538	285	592	4,415	12.5	465	1.3	27,655	6,100	1,706	35,461
1987	3,064	193	442	3,699	11.5	388	1.2	25,254	5,805	1,205	32,264
1988	3,189	170	499	3,858	10.9	386	1.1	26,887	7,296	1,247	35,431
1989	3,567	160	411	4,138	10.8	427	1.1	29,834	7,371	1,199	38,404
1990	3,381	78	401	3,860	11.0	392	1.1	27,879	6,189	1,162	35,230
1991	3,435	164	389	3,988	11.2	400	1.1	29,430	5,156	1,083	35,669

NA Not available.

* See notes on following page.

Table 4.8 (continued)

[1] Sales to other utilities for resale and sales of natural gas to Canada are not included.

[2] From 1950 to 1970, government and municipal sales were reported in the "Residential and Commercial" sector.

"Other" includes interdepartmental use, sales to government and municipal authorities for heating, and special off-line sales to firms in Montana where these figures are reported separately.

[3] Prior to 1975 "Other" includes interdepartmental use and natural gas used in MDU's electric generating plants at Baker, Glendive, and Miles City. Company consumption and unbilled customer consumption as part of a lease agreement at Saco are not included.

The 1975-81 data uses slightly different sector definitions; as a result, consumption in the "Other" sector is not shown separately for these years.

Since 1982 "Other" includes interdepartmental sales.

[4] "Other" includes sales to Malmstrom Air Force Base and other public authorities.

[5] "Other Utilities" includes the following companies (listed in approximate descending order by volume of sales):

Cut Bank Gas Company:	Supplies natural gas to Cut Bank; approximately 80 percent of its gas is purchased from the Montana Power Company.
Shelby Gas Association:	Supplies natural gas to Shelby; gas is purchased from the Montana Power Company.
Saco Municipal Gas Service:	Supplies natural gas to Saco from the town's own wells.
Consumers Gas Company:	Supplies natural gas to Sunburst and Sweetgrass; gas is purchased from the Montana Power Company and the J.R. Bacon Drilling Company through the Treasure State Pipeline Company.

Some of the smaller natural gas utilities have experienced problems measuring actual sales volumes. Therefore, the figures for these utilities should be considered estimates.

[6] All gas sales from "Other Utilities" are included under "Residential and Commercial."

The definition of "Other" varies from utility to utility and from year to year, as indicated.

NOTE: Source documents from the Public Service Commission often report data at sales pressure rather than at a uniform pressure base. When necessary, the data were converted to the uniform pressure base of 14.73 psia at 60 degrees Fahrenheit using Boyle's law.

The source reports are for the companies' fiscal years ending during the year shown. Because reporting years vary from utility to utility, the data represent various twelve-month periods and are, in that sense, not strictly comparable.

The Saco Municipal Gas Service and the Cut Bank Gas Company have reporting years ending June 30. The Shelby Gas Association's reporting year ends September 30. The Consumer Gas Company, the Montana Power Company, and Montana-Dakota Utilities use calendar year reporting periods.

The Great Falls Gas Company used a calendar year reporting period through 1981; they filed a six-month report for the period January 1, 1982, through June 30, 1982, and then changed to a twelve-month reporting period ending June 30.

Through 1981, Great Falls Gas Company figures are based on reports for the twelve months ending December 31 of that year. The 1982 figures were estimated by the sector averages from the 1981 and 1983 twelve-month reports. The 1983 figures and those for all subsequent years are based on twelve-month reports ending June 30 of that year.

SOURCE: Annual reports filed with the Montana Public Service Commission by the natural gas utilities (1950-91), supplemented by information obtained directly from the utilities.

Chapter 5: Crude Oil and Petroleum Products

Production History

The first oil wells drilled in Montana were located in the Butcher Creek drainage between Roscoe and Red Lodge, beginning in 1889. These wells were not very successful, and the first significant oil production in the state sprung from wells drilled in the northward extension of Wyoming's Elk Basin field in 1915. Montana's first new oil field was Cat Creek, discovered in 1920, soon followed by the Kevin Sunburst field discovery in 1922. Over the next 40 years, more oil fields were developed in the Williston Basin, the Sweetgrass Arch and Big Snowy Uplift areas, and in the northern extensions of Wyoming's Big Horn and Powder River Basins.

Montana's petroleum production peaked in 1968 at 48.5 million barrels, the result of cresting Williston Basin production combined with a surge of production from the newly discovered Bell Creek field in the Powder River Basin.

Production declined quickly until 1971, when a series of world oil supply shocks began to push prices upward, stimulating more drilling. Production remained relatively stable between 1971 and 1974 as Powder River Basin output increased to match a decline in Williston Basin output. In 1975 production began an 11 year decline from 35 to 29 million barrels annually, despite the continued escalation of oil prices to record highs. World oil price shocks stimulated a drilling boom which peaked at 1,149 new wells in 1981. Production increased in the Williston Basin during the early 1980s, but this was matched by a steep decline in output from other areas.

From 1986 to the present, annual production declined by nearly one third, as Williston Basin production began a steep decline. Drilling declined to 278 wells in 1991. That year, Williston Basin led production with nearly three quarters of Montana's total output of 19.6 million barrels.

State oil reserves were estimated at 156 million barrels in 1991, a decrease of about 12 percent from the previous year. Nearly 80 percent of state oil reserves are in the Williston Basin.

Pipelines and Refineries

Petroleum pipelines serving Montana consist of two separate systems, one bridging the Williston and Powder River basins in the east, the other linking the Sweetgrass Arch, Big Snowy and Big Horn producing areas in central Montana. Both systems move crude oil from Canada to Montana and Wyoming. In recent years, 80 percent of Montana oil production has been exported from the state, mostly to Wyoming through the eastern pipeline system.

Less than 10 percent of the refined products consumed in-state were made from Montana crude in 1991. Oil fields in the Sweetgrass Arch, Big Snowy and Big Horn areas provided Montana crude to four Montana refineries, Cenex in Laurel, Montana Refining in Great Falls, Conoco and Exxon in Billings. These facilities provided almost all of the petroleum products consumed in the state. Collectively, 58 percent of their crude oil came from Canada and 32 percent came from Wyoming. The shipments from Canada have increased since the late 1960s, as central Montana oil production began to decline.

Montana refineries pipe their products east to North Dakota, south to Wyoming and as far west as Spokane, Washington. About 98 percent of refinery output is moved by pipeline.

Petroleum Products Consumption

Petroleum product consumption in Montana peaked at 33 million barrels in 1979. Since then, it has drifted lower, with consumption in 1989 and 1990 under 27 million barrels, about 20 percent below peak consumption.

Petroleum products are used primarily for transportation fuels. In 1991, 39 percent of consumption was in the form of motor gasoline, 28 percent was distillate fuel, mostly diesel fuel, and 6 percent was asphalt and road oil. Another 16 percent was consumed in petroleum industry operations.

Transportation-related use of gas and diesel is discussed in greater detail in Chapter 7.

Table 5.1. Year-end Proved Reserves[1] of Crude Oil, 1950-91 (thousand barrels)

Year	United States[2]	Montana[2]	United States[3]	Montana[3]
1950	25,268,398	111,272		
1951	27,468,031	108,418		
1952	27,960,554	156,181		
1953	28,944,828	208,985		
1954	29,560,746	272,394		
1955	30,012,170	298,948		
1956	30,434,649	331,414		
1957	30,300,405	319,991		
1958	30,535,917	337,799		
1959	31,719,347	309,268		
1960	31,613,211	266,687		
1961	31,758,505	250,909		
1962	31,389,223	248,860		
1963	30,969,990	271,253		
1964	30,990,510	251,620		
1965	31,352,391	274,145		
1966	31,452,127	281,608		
1967	31,376,670	307,972		
1968	30,707,117	345,117		
1969	29,631,862	275,765		
1970	39,001,335	241,529		
1971	38,062,957	228,185		
1972	36,339,408	241,248		
1973	35,299,839	219,343		
1974	34,249,956	207,389		
1975	32,682,127	163,968		
1976	30,942,166	152,670	33,502,000	181,000
1977	29,486,402	151,601	31,780,000	175,000
1978	27,803,760	140,466	31,355,000	158,000
1979	27,051,289	136,590	29,810,000	152,000
1980			29,805,000	179,000
1981			29,426,000	186,000
1982			27,858,000	216,000
1983			27,735,000	234,000
1984			28,446,000	224,000
1985			28,416,000	232,000
1986			26,889,000	248,000
1987			27,256,000	246,000
1988			26,825,000	241,000
1989			26,501,000	225,000
1990			26,254,000	221,000
1991			24,682,000	201,000

NOTE: The American Gas Association discontinued independent crude oil reserve estimates in 1979. Beginning in 1980, the American Gas Association reported the reserve estimates calculated by the Department of Energy. Both Department of Energy and American Gas Association figures for 1976-79 are shown for comparison purposes.

1 Proved reserves are the estimated amount of oil that geologic and engineering data indicate is recoverable from known reservoirs under present economic and operating conditions.

2 SOURCES: American Petroleum Institute (1950-76); American Gas Association, *Gas Facts*, 1977-79.

3 SOURCES: U.S. Department of Energy, Energy Information Administration, *U.S. Crude Oil and Natural Gas Reserves*, annual reports for 1977-78 (EIA-0216); U.S. Department of Energy, Energy Information Administration, *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, annual reports for 1979-91 (EIA-0216).

Table 5.2. Estimates of Crude Oil Proved Reserves by Region, 1955-91 (thousand barrels)

As of January 1 of the Year	Region[1]					
	North	South Central	Central	Powder River Basin	Williston Basin	TOTAL
1955						289,742
1956						333,782
1957						341,969
1958						321,566
1959						325,484
1960						297,993 E
1961						254,946
1962						334,074
1963						341,225
1964						371,929 E
1965	147,007	69,895	29,637		161,504	408,043
1966	144,281	61,516	38,668		163,101	407,566
1967	137,638	56,828	39,424		159,470	393,360
1968	128,131	53,366	37,820	64,417	168,760	452,494
1969	121,999	35,913	29,906	97,497	166,742	452,057
1970	115,782	33,995	27,085	84,534	168,385	429,781
1971	121,160	29,703	26,698	77,045	170,508	425,114
1972	114,369	29,036	28,518	71,183	171,235	414,341
1973	102,484	18,917	25,704	64,751	154,271	366,127
1974	91,421	14,394	29,651	56,670	141,864	334,000
1975	76,739	10,996	26,688	47,336	148,241	310,000
1976	47,619	10,336	32,957	38,629	125,459	255,000
1977	43,119	9,581	31,647	29,922	118,726	232,500
1978	41,133	9,916	30,671	38,272	113,011	233,000
1979	40,800	12,000	28,801	26,401	132,003	240,005
1980	38,704	12,508	25,488	24,780	134,520	236,000
1981	39,680	12,400	22,320	17,360	156,240	248,000
1982	25,588	5,280	17,059	15,434	139,719	203,080
1983	27,427	4,571	11,428	13,714	171,420	228,560
1984	25,177	8,392	12,588	16,785	146,865	209,807
1985	21,265	11,814	7,088	14,177	181,936	236,280
1986	18,797	12,532	6,266	10,443	160,823	208,861
1987	30,529	6,684	10,477	3,793	129,160	180,643
1988	26,398	7,542	9,428	3,771	141,418	188,557
1989	26,348	9,410	13,174	1,882	137,387	188,201
1990	28,417	7,104	10,656	1,776	129,651	177,604
1991	13,906	7,727	4,637	1,548	128,215	156,033

E Two of the source publications were biennial rather than annual, and in each of these publications there was only one estimate of the crude oil reserves. Crude oil reserves for the two "missing" years have been interpolated from data values in the adjacent years.

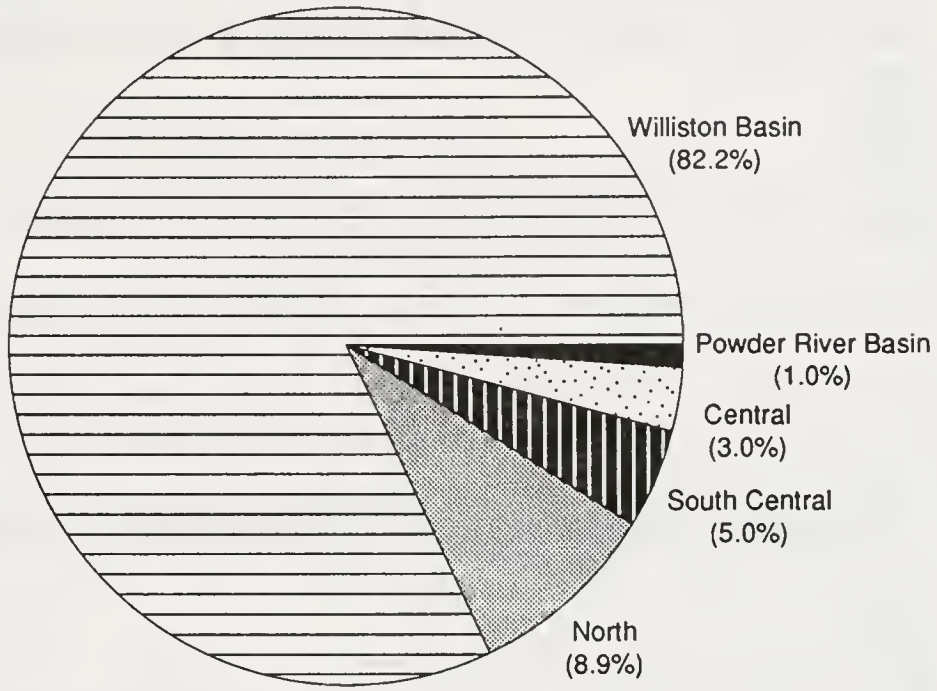
1 The regions shown correspond to the following geological basins:

Regions	Geological Basins
North	Sweetgrass Arch and Bearpaw Uplift
South Central	Big Horn Basin
Central	Big Snowy Uplift

NOTE: Reservoir parameters and production figures are supplied by operators. Reserve estimates are extrapolated from computer generated decline curves.

SOURCE: Montana Department of Natural Resources and Conservation, Oil and Gas Division, *Annual Review*, 1955-91.

Figure 5.1. Estimated Crude Oil Proved Reserves by Region, 1991



SOURCE: Table 5.2.

Reserves (thousand barrels)

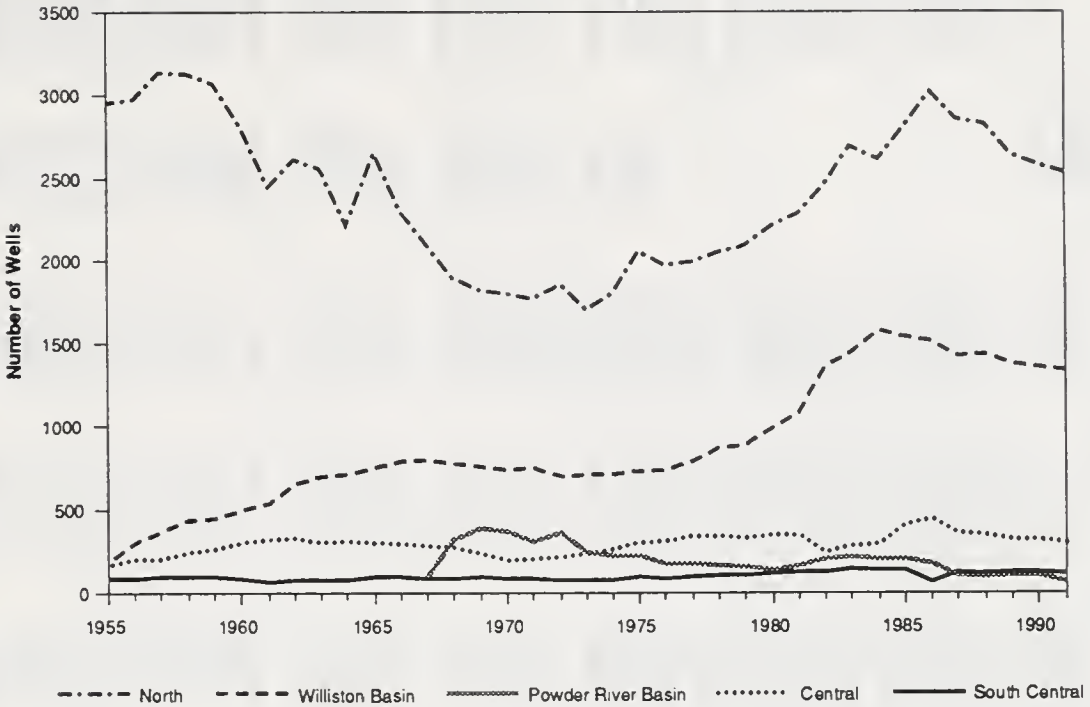
Williston Basin	North	South Central	Central	Powder River Basin	TOTAL
128,215	13,906	7,727	4,637	1,548	**156,033**

Table 5.3. Number of Producing Oil Wells by Region and Number of Oil and Gas Wells Drilled by Type, 1955-91

	Number of Producing Oil Wells						Number of Wells Drilled									
							Development					Exploratory				
Year	North	South Central	Central	Williston Basin	Powder River Basin	TOTAL	Oil	Gas	Dry Holes	Service Wells	Sub-Total	Oil	Gas	Dry Holes	Temporarily Abandoned	Sub-Total	TOTAL
1955	2,950	94	176	194		3,414	158	21	69		248	11	4	145		160	408
1956	2,969	96	213	306		3,584	229	6	75		310	12	0	171		183	493
1957	3,130	103	214	376		3,823	182	17	57		256	12	2	162		176	432
1958	3,120	102	248	446		3,916	159	7	46		212	12	2	109		123	335
1959	3,067	100	266	455		3,888	156	12	71		239	7	6	101		114	353
1960	2,811	96	303	497		3,707	114	4	58		176	14	3	150		167	343
1961	2,447	81	324	535		3,387	169	6	60		235	7	2	173		182	417
1962	2,615	88	333	656		3,692	182	16	57		255	8	2	154		164	419
1963	2,550	82	310	700		3,642	131	6	60		197	8	5	152		165	362
1964	2,216	88	317	708		3,329	100	7	109		216	22	3	150		175	391
1965	2,649	101	306	754		3,810	177	9	107		293	14	1	199		214	507
1966	2,308	106	301	792		3,507	179	9	96		284	10	3	185		198	482
1967	2,097	96	286	802	109	3,390	162	14	104		280	7	5	191		203	483
1968	1,898	99	282	784	328	3,391	300	14	89		403	15	13	509		537	940
1969	1,827	108	244	759	397	3,335	171	44	105		320	15	5	466		486	806
1970	1,806	92	200	743	371	3,212	60	30	63		153	12	11	272		295	448
1971	1,768	96	212	748	321	3,145	49	36	34		119	3	22	323		348	467
1972	1,856	83	224	706	265	3,134	79	97	87		263	7	19	435		461	724
1973	1,708	83	245	709	248	2,993	46	165	100		311	6	36	366		408	719
1974	1,802	86	267	712	233	3,100	58	179	212		449	7	21	265		293	742
1975	2,067	100	303	734	231	3,435	105	261	222		588	6	15	236		257	845
1976	1,978	97	316	737	181	3,309	106	264	169		539	17	8	223		248	787
1977	1,999	109	343	789	178	3,418	98	220	188		506	24	19	129		172	678
1978	2,052	115	347	863	169	3,546	123	223	232		578	21	15	179		215	793
1979	2,089	112	340	886	165	3,592	120	235	182		537	35	20	211		266	803
1980	2,212	124	358	996	148	3,838	241	203	206		650	30	12	260		302	952
1981	2,280	132	354	1,080	174	4,020	276	133	188		597	126	85	341		552	1,149
1982	2,455	138	249	1,360	212	4,414	263	145	120	19	547	64	46	248		358	905
1983	2,693	150	287	1,446	222	4,798	160	55	88	10	313	25	16	156	23	220	533
1984	2,610	144	294	1,577	214	4,839	327	99	87	20	533	33	21	189	25	268	801
1985	2,803	141	417	1,540	216	5,117	227	84	90	18	419	16	2	192	11	221	640
1986	3,017	80	453	1,509	184	5,243	90	81	69	4	244	11	10	130	10	161	405
1987	2,850	130	363	1,430	112	4,885	86	75	39	21	221	7	9	100	11	127	348
1988	2,821	128	355	1,434	103	4,841	72	54	46	12	184	10	19	100	9	138	322
1989	2,644	131	331	1,377	112	4,595	32	115	29	8	184	8	12	38	0	58	242
1990	2,579	135	323	1,356	118	4,514	34	180	39	5	258	4	12	57	1	74	332
1991	2,534	123	310	1,338	79	4,385	46	140	34	6	226	2	17	32	1	52	278

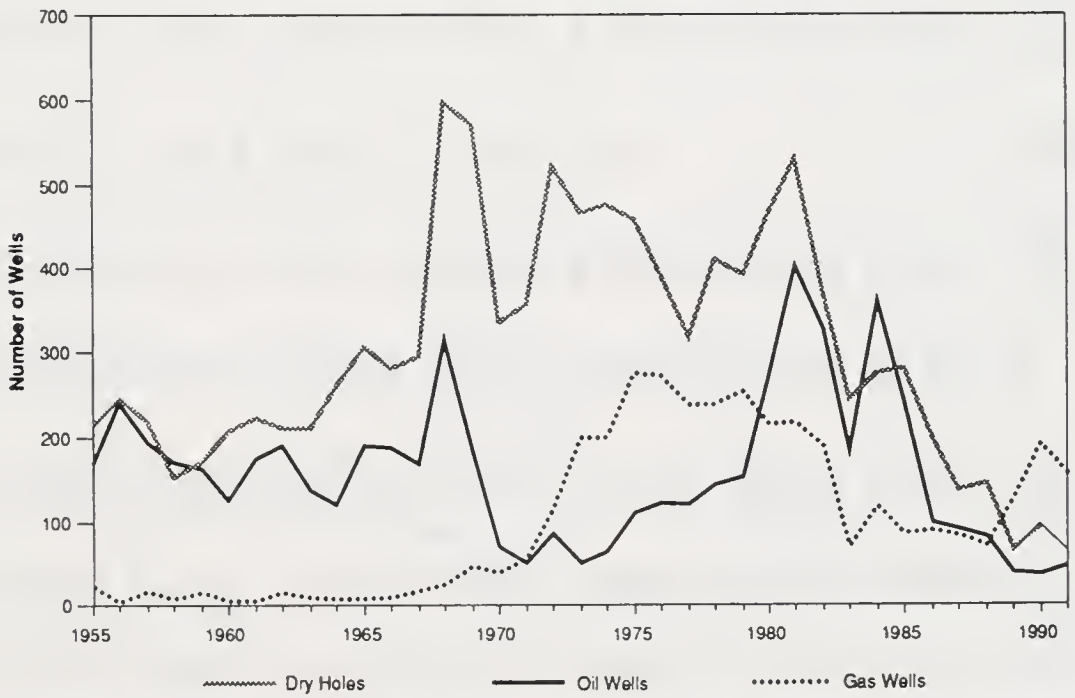
SOURCE: Montana Department of Natural Resources and Conservation, Oil and Gas Division, *Annual Review*, 1955-91.

Figure 5.2. Number of Producing Oil Wells by Region, 1955-91



SOURCE: Table 5.3.

Figure 5.3. Number of Oil Wells, Gas Wells and Dry Holes Drilled, 1955-91



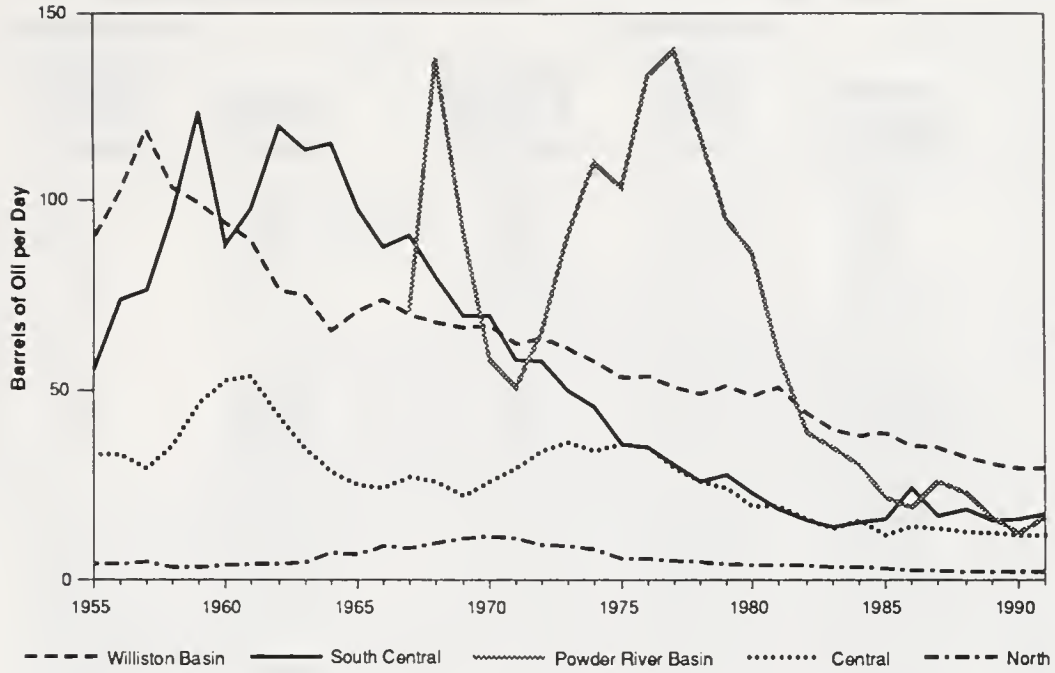
SOURCE: Table 5.3.

Table 5.4. Average Daily Oil Production per Well and Annual Production by Region, 1955-91

Year	Average Daily Production per Well (barrels)						Oil Production by Region (barrels)					
	North	South Central	Central	Williston Basin	Powder River Basin	STATE AVERAGE	North	South Central	Central	Williston Basin	Powder River Basin	TOTAL
1955	4.8	55.3	33.6	90.1		**12.6**	5,214,926	1,896,630	2,160,479	6,382,391		**15,654,426**
1956	4.7	73.5	33.4	102.5		**16.5**	5,083,953	2,585,437	2,610,047	11,480,124		**21,759,561**
1957	4.9	76.3	29.5	118.9		**19.4**	5,632,616	2,867,658	2,301,145	16,320,543		**27,121,962**
1958	3.8	96.4	35.4	103.3		**19.6**	4,348,256	3,590,554	3,201,003	16,816,816		**27,956,629**
1959	3.8	123.7	46.5	99.3		**21.1**	4,307,739	4,514,034	4,515,489	16,497,964		**29,835,226**
1960	4.2	88.1	52.3	93.9		**22.3**	4,332,218	3,087,871	5,780,420	17,039,406		**30,239,915**
1961	4.7	97.9	53.8	89.3		**25.0**	4,211,017	2,895,587	6,367,524	17,431,916		**30,906,044**
1962	4.5	119.9	43.4	76.3		**23.5**	4,252,304	3,851,672	5,279,163	18,264,368		**31,647,507**
1963	4.9	113.4	34.8	74.4		**23.2**	4,530,510	3,383,587	3,950,490	19,005,066		**30,869,653**
1964	7.4	115.1	28.8	65.7		**25.2**	5,705,948	3,699,927	3,269,768	17,971,855		**30,647,498**
1965	7.1	97.6	25.5	70.9		**23.6**	6,826,261	3,597,647	2,849,923	19,504,287		**32,778,118**
1966	9.5	87.7	24.7	73.6		**27.6**	7,991,302	3,392,890	2,710,194	21,285,732		**35,380,118**
1967	8.8	90.7	27.5	69.9	70.6	**28.2**	6,758,280	3,181,132	2,872,604	20,475,733	1,671,277	**34,959,026**
1968	9.9	79.6	26.4	67.6	138.0	**39.0**	6,883,493	2,885,272	2,728,357	19,390,652	16,572,472	**48,460,246**
1969	11.3	69.5	22.6	66.4	91.4	**36.1**	7,557,966	2,739,346	2,011,445	18,396,618	13,248,737	**43,954,112**
1970	11.6	69.3	26.2	66.8	57.9	**32.3**	7,680,831	2,329,187	1,915,273	18,110,147	7,843,259	**37,878,697**
1971	11.3	57.9	29.4	62.4	50.9	**30.1**	7,292,476	2,028,304	2,274,124	17,042,703	5,961,116	**34,598,723**
1972	9.8	57.4	34.4	63.3	65.3	**29.6**	6,646,908	1,742,749	2,817,045	16,361,771	6,335,666	**33,904,139**
1973	9.5	50.0	36.2	60.8	90.4	**31.7**	5,948,826	1,515,088	3,238,967	15,735,703	8,181,598	**34,620,182**
1974	8.3	45.6	34.2	57.4	110.3	**30.5**	5,464,319	1,432,528	3,334,759	14,939,292	9,383,064	**34,553,962**
1975	6.0	36.1	35.8	53.4	103.2	**26.2**	4,551,324	1,318,779	3,954,024	14,312,685	8,706,862	**32,843,674**
1976	5.8	35.1	35.2	53.8	133.3	**27.1**	4,200,539	1,246,005	4,063,897	14,496,380	8,807,439	**32,814,260**
1977	5.6	30.4	29.4	50.8	140.2	**26.2**	4,060,957	1,210,064	3,677,361	14,621,635	9,110,037	**32,680,054**
1978	4.9	26.1	26.4	48.9	117.6	**23.5**	3,671,322	1,095,737	3,343,556	15,103,853	7,252,869	**30,467,337**
1979	4.6	27.7	24.4	51.2	94.9	**22.9**	3,536,296	1,131,798	3,029,397	16,546,576	5,713,032	**29,957,099**
1980	4.3	23.2	19.9	48.7	86.0	**21.1**	3,516,807	1,055,105	2,612,091	17,739,142	4,660,659	**29,583,804**
1981	4.3	18.9	20.0	50.6	59.2	**21.0**	3,605,207	910,595	2,583,690	19,954,159	3,759,760	**30,813,411**
1982	4.1	16.0	16.5	44.2	38.8	**19.2**	3,680,043	806,366	1,496,895	21,934,760	2,999,247	**30,917,311**
1983	3.7	14.4	14.0	39.6	35.1	**16.9**	3,682,130	790,150	1,467,855	20,877,527	2,847,618	**29,665,280**
1984	3.9	15.8	15.9	37.9	30.4	**17.0**	3,708,185	829,090	1,709,653	21,449,415	2,383,476	**30,079,819**
1985	3.3	16.3	12.3	39.1	22.1	**16.0**	3,419,300	838,817	1,868,780	21,979,087	1,744,433	**29,850,417**
1986	2.9	24.7	14.4	35.4	19.5	**14.2**	3,220,769	722,118	2,387,266	19,520,103	1,314,374	**27,164,630**
1987	2.9	17.4	13.9	35.1	26.2	**14.1**	3,040,941	827,229	1,847,551	18,319,149	1,069,179	**25,104,049**
1988	2.7	18.9	13.0	32.6	23.3	**13.2**	2,779,524	884,954	1,684,853	17,089,238	878,887	**23,317,456**
1989	2.6	16.2	12.8	30.8	16.8	**12.5**	2,488,169	773,372	1,544,989	15,476,534	686,228	**20,969,292**
1990	2.6	16.4	12.3	29.5	12.8	**12.0**	2,432,506	805,807	1,454,066	14,592,497	550,211	**19,835,087**
1991	2.7	17.9	12.3	29.4	16.9	**12.2**	2,510,130	804,003	1,393,046	14,380,288	485,881	**19,573,348**

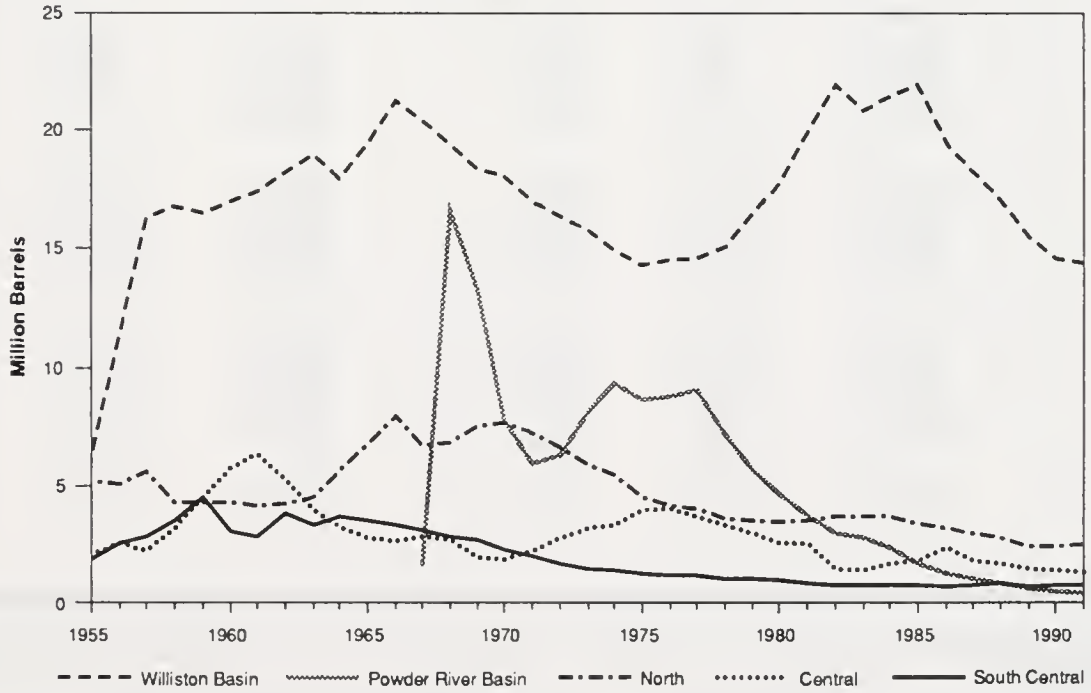
SOURCE: Montana Department of Natural Resources and Conservation, Oil and Gas Division, *Annual Review*, 1955-91.

Figure 5.4. Average Daily Oil Production per Well by Region, 1955-91



SOURCE: Table 5.4.

Figure 5.5. Oil Production by Region, 1955-91



SOURCE: Table 5.4.

Table 5.5. Crude Oil Production and Average Wellhead Prices[1], 1950-91

Year	DNRC Statistics[2]			DOR Statistics[3]		
	Crude Oil Production (Mbbls)	Average Wellhead Price ($/bbl)	Gross Value of Montana Production (million $)	Crude Oil Production (Mbbls)	Average Wellhead Price ($/bbl)	Gross Value of Montana Production (million $)
1950	8,109	$2.46	$19.9	7,841	$2.47	$19.4
1951	8,958	2.37	21.2	8,814	2.35	20.7
1952	9,606	2.25	21.6	9,527	2.26	21.5
1953	11,920	2.18	26.0	11,793	2.23	26.3
1954	14,195	2.20	31.2	14,023	2.22	31.1
1955	15,654	2.26	35.4	16,548	2.18	36.1
1956	21,760	2.45	53.3	21,262	2.47	52.5
1957	27,122	2.66	72.1	26,658	2.43	64.8
1958	27,957	2.65	74.1	27,816	2.62	72.9
1959	29,857	2.53	75.5	29,985	2.50	75.0
1960	30,240	2.41	72.9	29,937	2.45	73.3
1961	30,906	2.42	74.8	30,499	2.42	73.8
1962	31,648	2.42	76.6	31,270	2.44	76.3
1963	30,870	2.44	75.3	30,364	2.44	74.1
1964	30,647	2.43	74.5	30,241	2.45	74.1
1965	32,778	2.43	79.7	32,089	2.44	78.3
1966	35,380	2.44	86.3	34,734	2.45	85.1
1967	34,959	2.50	87.4	34,316	2.50	85.8
1968	48,460	2.57	124.5	47,152	2.56	120.7
1969	43,954	2.69	118.2	44,446	2.76	122.7
1970	37,879	2.78	105.3	38,058	2.83	107.7
1971	34,599	3.01	104.1	34,625	3.05	105.6
1972	33,904	3.06	103.7	34,572	2.99	103.4
1973	34,620	3.33	115.3	34,584	3.85	133.1
1974	34,554	6.85	236.7	34,629	6.82	236.2
1975	32,844	7.83	257.2	32,815	7.83	256.9
1976	32,814	8.42	276.3	32,057	8.49	272.2
1977	32,680	8.63	282.0	30,696	9.07	278.4
1978	30,467	9.25	281.8	30,935	9.31	288.0
1979	29,957	12.39	371.2	30,286	13.00	393.7
1980	29,584	22.24	657.9	29,927	20.92	626.1
1981	30,813	34.73	1070.1	30,518	34.48	1052.3
1982	30,917	31.26	966.5	30,938	31.14	963.4
1983	29,665	28.79	854.1	29,320	28.74	842.7
1984	30,080	28.04	843.4	30,668	27.58	845.8
1985	29,934	25.23	755.2	30,285	25.21	763.5
1986	27,165	13.52	367.3	26,863	13.47	361.8
1987	25,104	16.62	417.2	24,226	16.57	401.4
1988	23,317	13.87	323.4	21,999	13.85	304.7
1989	20,969	17.08	358.2	19,079	16.61	317.0
1990	19,835	21.58	428.0	18,423	21.50	396.1
1991	19,573	18.18	355.8	17,981	18.17	326.7

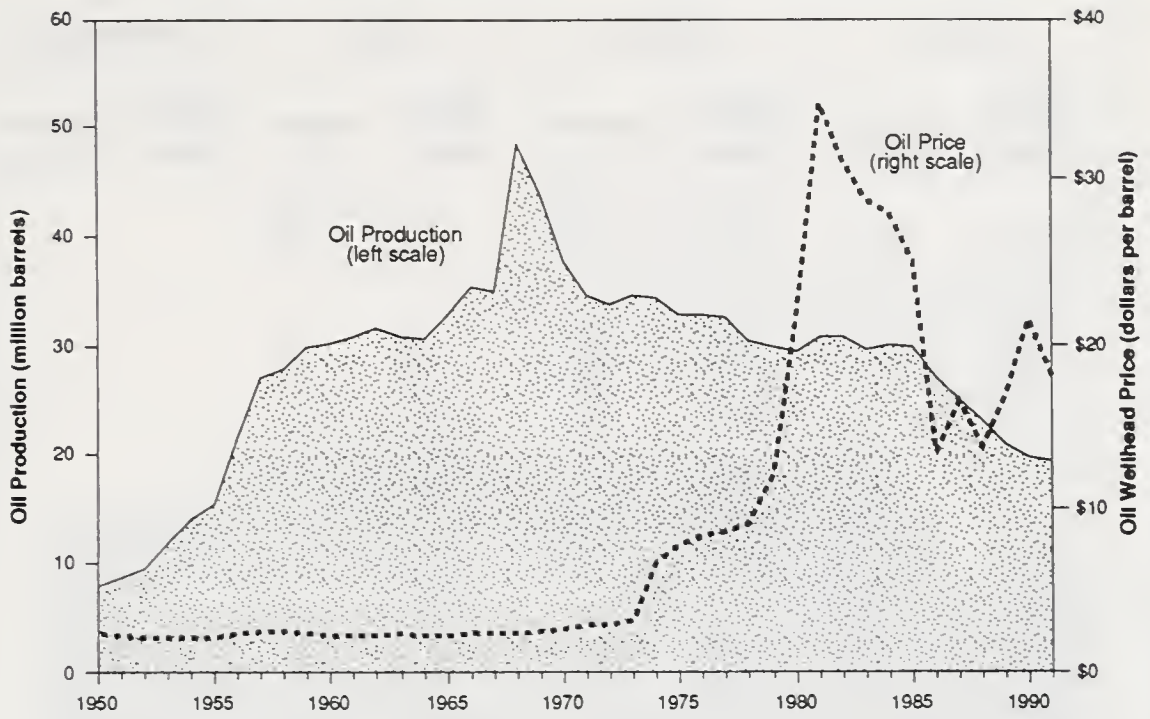
[1] Average wellhead prices were computed by dividing the gross value of production by the number of barrels extracted.

[2] SOURCE: Montana Department of Natural Resources and Conservation, Oil and Gas Conservation Division, *Annual Review*, 1950-91.

[3] SOURCES: Montana Department of Revenue, Property Assessment Division (1950-81); Montana Department of Revenue, Research and Information Division (1982); Montana Department of Revenue, Natural Resource and Corporation Tax Division (1983-91).

NOTE: Not all oil production is taxed by the state.

Figure 5.6. Crude Oil Production and Average Wellhead Price, 1950-91



SOURCE: Table 5.5: DNRC Statistics.

Table 5.6. Total Refinery Receipts by Source of Crude Oil, 1953-91 (thousand barrels)

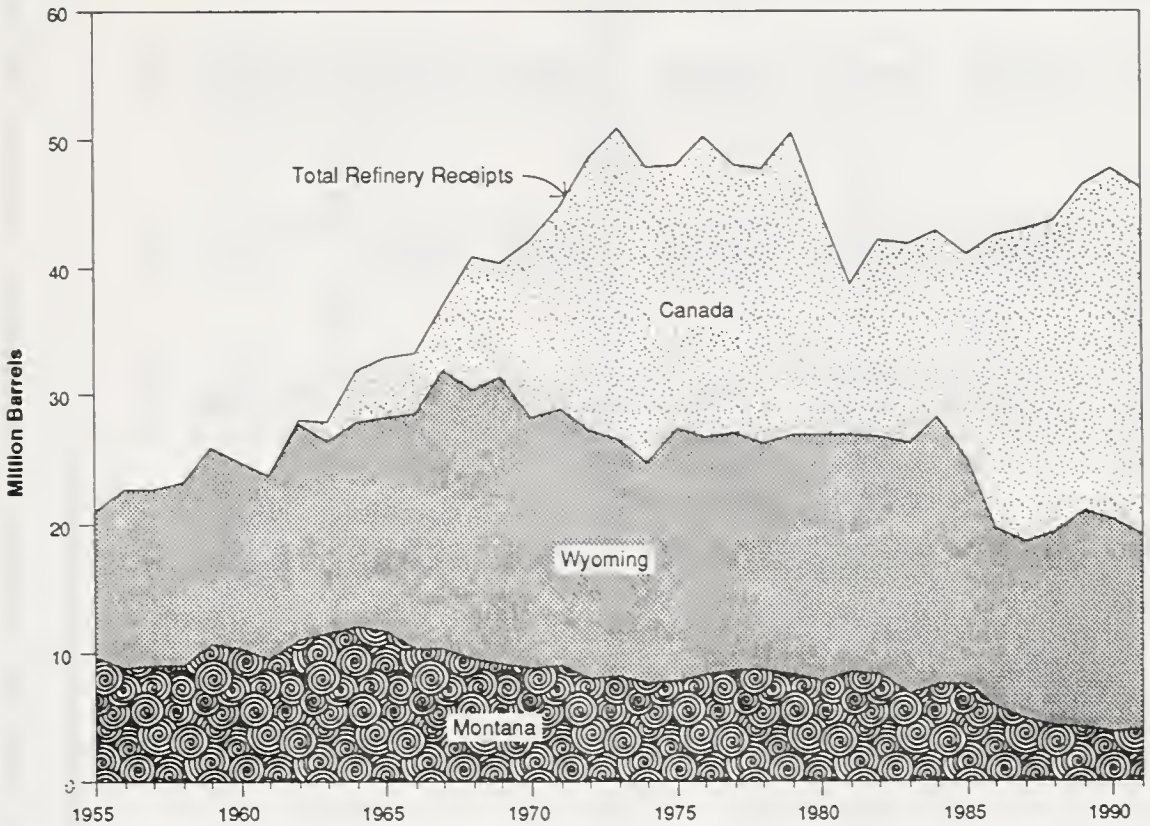
Year	MONTANA		WYOMING		CANADA		NORTH DAKOTA		TOTAL[1]
	Crude Oil Refined In Montana	Percentage of Total	Crude Oil Refined In Montana	Percentage of Total	Crude Oil Refined In Montana	Percentage of Total	Crude Oil Refined In Montana	Percentage of Total	
1953	7,497	38.3%	12,112	61.7%	0	0.0%			19,609
1954	9,034	45.4	10,865	54.5	0	0.0			19,909
1955	9,858	46.8	11,210	53.1	0	0.0			21,081
1956	9,053	39.6	13,720	60.0	88	0.4			22,861
1957	9,222	40.1	13,665	59.5	92	0.4			22,979
1958	9,165	39.4	14,089	60.5	12	0.1			23,265
1959	10,913	41.9	15,141	58.1	4	0.0			26,059
1960	10,531	42.3	14,383	57.7	21	0.1			24,935
1961	9,797	41.0	14,038	58.8	33	0.1			23,869
1962	11,175	39.7	16,708	59.4	266	0.9			28,149
1963	11,798	42.0	14,745	52.5	1,553	5.5			28,097
1964	12,292	38.4	15,714	49.1	4,002	12.5			32,007
1965	11,971	36.2	16,416	49.7	4,654	14.1			33,041
1966	10,626	31.8	18,120	54.2	4,684	14.0			33,429
1967	10,632	28.7	21,393	57.7	5,052	13.6			37,078
1968	9,690	23.7	20,915	51.0	10,347	25.2			40,951
1969	9,465	23.4	22,130	54.7	8,843	21.9			40,438
1970	9,080	21.5	19,342	45.7	13,908	32.8			42,330
1971	9,262	20.6	19,732	43.8	16,003	35.6			42,997
1972	8,194	16.9	19,241	39.6	21,156	43.5			48,591
1973	8,437	16.6	18,235	35.8	24,295	47.7			50,967
1974	7,989	16.6	16,949	35.3	23,115	48.1			48,053
1975	8,002	16.6	19,465	40.4	20,690	43.0			48,157
1976	8,517	16.9	18,311	36.4	23,494	46.7			50,322
1977	8,928	18.5	18,248	37.8	20,921	43.3	200	0.4%	48,297
1978	8,848	18.5	17,513	36.6	21,369	44.7	69	0.1	47,739
1979	8,668	17.1	18,368	36.3	23,578	46.6	6	0.0	50,620
1980	8,016	17.9	19,050	42.6	17,627	39.4	25	0.1	44,719
1981	8,691	22.4	18,298	47.2	11,797	30.4	14	0.0	38,801
1982	8,653	20.5	18,178	43.0	15,402	36.5		0.0	42,234
1983	7,120	16.9	19,183	45.7	15,584	37.2	45	0.1	41,932
1984	7,821	18.2	20,552	47.9	14,516	33.8	55	0.0	42,945
1985	7,804	19.0	17,258	41.9	16,075	39.1	10	0.0	41,149
1986	6,019	14.1	13,795	32.4	22,778	53.5			42,593
1987	4,993	11.6	13,758	31.9	24,396	56.5			43,147
1988	4,607	10.5	14,907	34.0	24,306	55.5			43,820
1989	4,475	9.6	16,675	35.8	25,480	54.6			46,630
1990	4,057	8.5	16,431	34.4	27,271	57.1			47,760
1991	4,272	9.2	15,031	32.5	26,991	58.3			46,294

[1] Includes 9,000 barrels from South Dakota in 1954 and 13,000 barrels from South Dakota in 1955.

NOTE: Data originally reported by the Montana Oil and Gas Conservation Division have been revised on the basis of further information received from individual refineries. The Oil and Gas Conservation Division data originally understated Canadian inputs and overstated Wyoming inputs to the Continental Oil refinery, at least for the years 1968-75. Canadian inputs to the Big West Oil and Westco refineries were apparently not reported to the Oil and Gas Conservation Division. Revised data are available only for the years 1972-75, but it is likely that Canadian inputs to these two refineries were significant before 1972.

SOURCE: Montana Department of Natural Resources and Conservation, Oil and Gas Conservation Division, *Annual Review*, 1953-91.

Figure 5.7. Refinery Receipts by Source of Crude Oil, 1955-91



NOTE: Crude oil received from North and South Dakota not shown due to the small volumes.

SOURCE: Table 5.6.

Table 5.7. Petroleum Product Consumption Estimates, 1960-90 (thousand barrels)

Year	Asphalt and Road Oil	Aviation Gasoline	Distillate Fuel	Jet Fuel	Kerosene	LPG	Lubricants	Motor Gasoline	Residual Fuel	Other[1]	TOTAL
1960	865	1,006	4,898	265	477	737	161	6,922	2,063	1,635	**19,028**
1961	823	1,427	5,278	280	366	859	157	6,979	2,580	2,023	**20,771**
1962	786	473	5,549	311	265	819	171	7,553	3,052	2,149	**21,127**
1963	900	499	5,393	340	359	766	171	7,481	2,852	2,508	**21,269**
1964	1,328	340	5,702	360	679	925	179	7,374	2,300	2,403	**21,590**
1965	1,003	312	4,962	384	248	926	189	7,709	1,241	2,531	**19,505**
1966	974	198	5,695	441	118	1,167	196	7,953	1,459	2,697	**20,897**
1967	1,066	131	3,394	574	859	1,585	175	8,104	1,231	2,871	**19,990**
1968	1,221	65	4,113	697	815	1,689	192	8,585	1,509	3,314	**22,201**
1969	1,189	38	4,641	806	657	1,690	196	8,737	1,556	3,558	**23,069**
1970	1,347	43	4,827	649	376	1,326	200	9,262	1,268	3,155	**22,452**
1971	1,337	42	5,715	767	362	1,402	188	9,494	1,262	3,109	**23,679**
1972	1.489	94	6,206	762	383	1,705	201	10,137	1,469	3,565	**26,009**
1973	1,397	110	6,989	757	405	1,503	219	10,883	1,765	3,779	**27,809**
1974	1,222	105	7,840	780	174	1,466	210	10,550	2,262	3,470	**28,079**
1975	924	79	7,586	818	122	1,370	208	10,630	2,178	3,410	**27,325**
1976	1,283	94	8,411	753	79	1,421	231	11,605	2,525	3,265	**29,667**
1977	1,133	92	8,258	772	93	1,368	247	11,100	2,506	3,503	**29,072**
1978	942	87	8,232	699	95	1,662	266	12,809	2,502	3,493	**30,787**
1979	1,054	122	9,037	907	17	1,094	278	11,162	5,773	3,298	**32,743**
1980	1,020	159	7,509	920	0	1,806	247	10,416	4,025	3,007	**29,110**
1981	1,035	177	6,469	800	26	1,027	237	10,797	2,494	2,721	**25,783**
1982	884	92	5,828	625	0	1,446	216	10,429	1,608	2,534	**23,661**
1983	1,130	102	8,863	652	18	1,497	227	10,525	1,306	2,422	**26,741**
1984	1,215	77	9,446	642	19	1,032	242	10,451	798	2,691	**26,614**
1985	1,463	91	11,317	678	10	1,576	225	10,185	133	2,581	**28,258**
1986	1,989	105	7,004	867	22	1,505	220	10,158	47	2,657	**24,575**
1987	1,642	82	6,556	718	8	1,716	249	10,234	23	3,392	**24,620**
1988	1,473	107	6,308	809	4	1,515	240	10,455	220	3,801	**24,932**
1989	1,749	95	7,679	750	3	1,742	246	10,305	181	3,913	**26,663**
1990	1,487	111	7,422	708	8	1,848	253	10,269	219	4,255	**26,580**

[1] In Montana "Other Petroleum Products" are used primarily in petroleum industry operations and as refinery fuels.

NOTE: DOE models provide the best consumption estimates available. However, some of the more dramatic year-to-year variation in consumption levels may be due to the models themselves or to changes in the models or data sources.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates*, 1960-90 (DOE/EIA 0214).

Table 5.8. Residential Petroleum Product Consumption Estimates, 1960-90 (thousand barrels)

Year	Distillate Fuel	LPG[1]
1960	262	506
1961	335	616
1962	335	560
1963	328	499
1964	312	655
1965	277	636
1966	286	758
1967	196	994
1968	250	1,068
1969	289	1,072
1970	249	887
1971	397	905
1972	436	1,094
1973	495	965
1974	542	1,026
1975	589	973
1976	646	993
1977	616	993
1978	657	1,276
1979	675	606
1980	421	829
1981	273	503
1982	352	736
1983	449	901
1984	459	428
1985	345	604
1986	351	641
1987	247	709
1988	235	715
1989	366	831
1990	288	813

[1] DOE has numerous caveats on its allocation of LPG consumption to the various sectors.

NOTE: This table excludes a small amount of kerosene consumption, which could not be estimated accurately by DOE models.

DOE models provide the best consumption estimates available. However, some of the more dramatic year-to-year variation in consumption levels may be due to the models themselves or to changes in the models or data sources.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates*, 1960-90 (DOE/EIA 0214).

Table 5.9. Commercial Petroleum Product Consumption Estimates, 1960-90 (thousand barrels)

Year	Distillate Fuel	LPG[1]	Motor Gasoline[2]	Residual Fuel
1960	297	89	135	2
1961	380	109	146	3
1962	380	99	121	4
1963	372	88	141	4
1964	354	116	127	3
1965	315	112	144	1
1966	324	134	123	1
1967	223	175	135	1
1968	284	188	133	1
1969	329	189	107	1
1970	283	157	220	1
1971	451	160	127	1
1972	496	193	168	1
1973	562	170	136	1
1974	616	181	125	2
1975	668	172	174	2
1976	734	175	163	3
1977	699	175	157	3
1978	746	225	167	4
1979	766	107	179	11
1980	346	146	92	7
1981	380	89	110	0
1982	183	130	127	5
1983	1,104	159	76	172
1984	1,128	75	61	105
1985	863	107	72	126
1986	403	113	76	37
1987	305	125	79	13
1988	199	126	76	9
1989	204	147	77	13
1990	153	143	83	11

[1] DOE has numerous caveats on its allocation of LPG consumption to the various sectors.

[2] Includes miscellaneous (including unclassified) and public nonhighway sales of motor gasoline.

NOTE: This table does not include kerosene.

DOE models provide the best consumption estimates available. However, some of the more dramatic year-to-year variation in consumption levels may be due to the models themselves or to changes in the models or data sources.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates*, 1960-90 (DOE/EIA 0214).

Table 5.10. Industrial Petroleum Product Consumption Estimates, 1960-90 (thousand barrels)

Year	Distillate Fuel[1]	LPG[2]	Motor Gasoline[3]	Residual Fuel[4]
1960	1,500	112	816	1,684
1961	1,841	104	923	1,960
1962	2,159	125	685	2,575
1963	2,174	145	796	2,438
1964	2,331	128	746	1,986
1965	1,693	164	887	914
1966	2,123	254	681	980
1967	1,033	356	791	882
1968	1,222	359	745	1,242
1969	1,373	361	476	1,212
1970	1,274	246	635	1,123
1971	1,750	282	570	1,174
1972	1,863	339	702	1,390
1973	2,073	302	568	1,577
1974	2,413	206	503	2,126
1975	2,494	174	774	1,963
1976	2,926	202	774	2,303
1977	2,890	162	703	2,176
1978	2,375	115	578	2,270
1979	2,787	364	663	5,609
1980	1,925	786	619	4,018
1981	1,943	382	663	2,494
1982	1,396	551	632	1,603
1983	3,173	383	509	1,132
1984	3,241	460	558	692
1985	5,798	814	677	7
1986	2,124	696	637	10
1987	1,802	844	573	10
1988	1,619	626	576	211
1989	2,783	711	631	168
1990	2,749	824	611	208

[1] Includes deliveries for industrial use (including industrial space heating and farm use), oil company use, off-highway use, and "other" uses. Does not include use at electric utilities.

[2] DOE has numerous caveats on its allocation of LPG consumption to the various sectors.

[3] Includes sales for agricultural use, construction use, and industrial and commercial use.

[4] Includes industrial use, oil company use, and "other" uses.

NOTE: This table does not include the categories asphalt and road oil, kerosene, lubricants, and other petroleum products.

DOE models provide the best consumption estimates available. However, some of the more dramatic year-to-year variation in consumption levels may be due to the models themselves or to changes in the models or data sources.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates*, 1960-90 (DOE/EIA 0214).

Table 5.11. Transportation Petroleum Product Consumption Estimates, 1960-90[1] (thousand barrels)

Year	Aviation Gasoline[2]	Distillate Fuel[3]	Jet Fuel[4]	LPG[5]	Motor Gasoline	Residual Fuel[6]
1960	1,006	2,839	265	29	5,972	377
1961	1,427	2,721	280	31	5,910	617
1962	473	2,675	311	35	6,747	471
1963	499	2,520	340	34	6,544	410
1964	340	2,705	360	26	6,501	307
1965	312	2,676	384	13	6,678	325
1966	198	2,961	441	21	7,148	396
1967	131	1,941	574	60	7,178	342
1968	65	2,356	697	73	7,708	243
1969	38	2,649	806	68	8,155	238
1970	43	3,020	649	36	8,407	119
1971	42	3,116	767	56	8,797	87
1972	94	3,408	762	78	9,267	63
1973	110	3,834	757	65	10,179	44
1974	105	4,266	780	53	9,922	122
1975	79	3,835	818	50	9,682	160
1976	94	4,101	753	50	10,668	141
1977	92	4,049	772	37	10,240	136
1978	87	4,451	699	46	12,064	134
1979	122	4,791	907	18	10,320	24
1980	159	4,759	920	45	9,705	0
1981	177	3,834	800	52	10,024	0
1982	92	3,866	625	29	9,671	0
1983	102	4,106	652	54	9,940	3
1984	77	4,540	642	69	9,831	2
1985	91	4,273	678	51	9,437	*
1986	105	4,101	867	55	9,445	0
1987	82	4,157	718	38	9,582	0
1988	107	4,192	809	48	9,802	0
1989	95	4,266	750	53	9,598	0
1990	111	4,169	708	67	9,575	0

* Less than 0.5.

1 This table does not cover all uses of gasoline included in "Highway Use of Motor Fuel" in Table 7.1.

2 Includes military and non-military use.

3 Includes deliveries for military use, railroad use and highway use.

4 Non-military use only of kerosene-type jet fuel.

5 DOE has numerous caveats on its allocation of LPG consumption to the various sectors.

6 Includes military use and railroad use.

NOTE: This table does not include lubricants.

DOE models provide the best consumption estimates available. However, some of the more dramatic year-to-year changes in consumption levels may be due to the models themselves or to changes in the models or data sources.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates*, 1960-90 (DOE/EIA 0214).

Chapter 6: Renewable Energy

Wind

Large areas of Montana have winds that might be usable to generate electricity. The actual extent of the area is not known, given the limited number of monitoring sites. All the area along the Rocky Mountain front appears promising. Other, smaller sites at passes in western Montana also have attracted attention. Annual average wind speeds at the best sites range from 15 to 18 miles per hour, comparable to any site in California, where the major development in the United States has taken place.

Wind development companies are actively prospecting on the Blackfeet Reservation, around Livingston, and on Norris Hill, north of Ennis. At present, only a handful of older, relatively small wind machines are operational.

Solar

On a yearly basis, Montana receives more solar energy per square foot than do most areas in those states east of the Dakotas and Texas; however, its resource is less than two-thirds that of the southwestern desert regions. In Montana, average daily global radiation on a horizontal surface ranges from 1,148 Btu per square foot in Kalispell to 1,312 Btu per square foot in Billings. The radiation varies significantly with the seasons. The global radiation in July is five to seven times that in December.

No data are available on the present use of solar energy in the state. A few residences and businesses use solar energy to supplement home or domestic water heating. Photovoltaics are widely used in remote applications, such as communication facilities, where providing electricity by conventional means is prohibitively expensive.

Ethanol

Montana has a small ethanol industry. At present only one plant in Montana, at Ringling, produces ethanol, primarily for export to other states. A larger plant is planned for Great Falls in the near future. Both these plants use grains grown in Montana, usually wheat.

Ethanol is used to make gasohol, a 9:1 blend of gasoline and ethanol. In 1990, about 1 percent of the gasoline consumed in Montana actually was gasohol. Almost all the gasohol consumed is imported from other states.

Other Renewable Resources

Montana has large amounts of biomass residue from its agricultural and timber products industries. Most biomass used in Montana is burned to provide heat. Estimates of biomass use are sketchy. Some effort is being made to develop safflower oil as a petroleum substitute, but this still is in the initial stages.

Geothermal waters appear in numerous areas across Montana. None of these resources are hot enough to justify utility-scale applications, given current technology. Some of the better resources are located in or near environmentally sensitive areas, which would hinder any move to develop them.

Hydropower sites, especially ones supporting large scale facilities, have been developed all over Montana. Data on these are presented in Chapter 2.

Table 6.1. Average Wind Speed at Selected High Potential Sites (miles per hour)

SITE NAME	ANEMOMETER HEIGHT (feet)	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Average Speed
Heart Butte	35.0	27.5	24.2	20.3	16.7	24.4	10.4	13.9	11.8	15.1	15.0	15.7	13.9	**18.0**
Norris Hill	33.0	21.1	20.9	17.1	17.0	15.1	13.6	11.6	13.5	14.5	20.0	17.9	22.9	**17.0**
Blackfoot	30.0	22.2	26.1	13.2	19.0	13.1	12.8	11.2	14.8	16.5	17.2	18.8	23.5	**16.4**
Livingston Wind Turbine Site[1]	30.0	17.7	20.7	12.6	14.8	11.0	11.8	11.9	9.5	11.3	15.1	19.3	23.3	**15.6**
Whitehall FAA Airport	30.0	17.7	16.3	13.4	13.0	11.6	11.9	10.7	9.8	10.3	11.6	14.3	17.0	**13.2**
Judith Gap	22.5	15.6	15.0	13.3	13.7	13.7	11.7	11.5	10.7	12.2	12.8	12.3	14.3	**13.0**
Cut Bank	33.0	13.4	12.9	12.4	13.5	14.8	13.1	12.6	10.5	12.3	12.5	12.0	13.3	**12.8**
Hays	33.0	13.2	12.3	10.4	13.5	12.2	12.1	10.3	8.9	9.2	11.3	13.7	13.9	**12.0**
Great Falls NWS Airport	22.0	13.6	13.2	12.8	11.9	11.0	10.5	9.4	9.6	10.5	12.8	13.2	14.8	**11.9**
Scobey-Hanrahan	33.0	14.3	12.9	14.4	9.7	15.6	11.3	10.6	9.4	11.3	13.6	7.2	9.9	**11.6**
Glasgow NWS Airport	20.0	10.3	10.5	11.4	13.0	11.9	11.2	10.5	11.0	11.0	10.5	9.8	10.3	**11.0**
Miles City FAA Airport	40.0	10.1	10.1	11.0	11.9	11.4	10.5	9.8	9.8	10.3	10.3	9.8	10.1	**10.5**
Salem	33.0	8.0	13.8	8.6	13.0	8.7	10.1	9.0	7.8	9.8	10.9	13.6	14.3	**10.2**
Choteau	33.0	7.3	11.6	10.2	10.1	11.1	9.5	9.0	8.3	9.7	11.0	10.7	12.2	**10.1**

[1] More recent monitoring at other sites around Livingston has identified better wind resources.

SOURCE: Montana Dept. of Natural Resources and Conservation, Energy Division, *Montana Wind Energy Atlas*, 1987 Edition.

Figure 6.1. Selected High Potential Wind Monitoring Sites

SOURCE: Table 6.1.

Table 6.2. Average Daily Solar Radiation, 1961-90 (Btu per square foot)

	Global Radiation on a Horizontal Surface	Standard Deviation[1]	Direct Normal Solar Radiation	Standard Deviation[1]
Billings				
January	530	40	824	193
February	809	48	1,053	181
March	1,209	78	1,311	258
April	1,572	114	1,513	316
May	1,865	124	1,735	287
June	2,121	133	2,101	309
July	2,220	113	2,458	285
August	1,935	91	2,274	257
September	1,429	128	1,800	377
October	971	61	1,408	233
November	597	36	936	179
December	457	24	806	132
Annual Average	**1,312**	**32**	**1,521**	**106**
Cut Bank				
January	432	29	787	179
February	712	41	1,055	194
March	1,110	77	1,297	251
April	1,550	112	1,561	316
May	1,875	105	1,763	247
June	2,079	161	1,972	357
July	2,192	106	2,396	252
August	1,836	125	2,082	326
September	1,327	138	1,627	406
October	879	53	1,309	215
November	504	33	894	179
December	362	22	737	147
Annual Average	**1,241**	**32**	**1,459**	**106**
Glasgow				
January	463	30	737	174
February	744	66	986	188
March	1,135	103	1,252	284
April	1,502	120	1,489	364
May	1,800	149	1,650	338
June	2,055	140	1,976	319
July	2,133	110	2,284	260
August	1,809	110	2,041	288
September	1,296	121	1,564	350
October	848	46	1,209	179
November	499	32	814	167
December	371	23	646	147
Annual Average	**1,223**	**31**	**1,390**	**95**
Great Falls				
January	458	35	728	202
February	751	49	990	255
March	1,161	85	1,252	296
April	1,539	115	1,428	301
May	1,847	129	1,645	286
June	2,114	161	1,966	385
July	2,237	114	2,398	284
August	1,872	121	2,083	331
September	1,364	138	1,647	387
October	902	62	1,270	249
November	529	39	847	173
December	382	30	675	175
Annual Average	**1,266**	**39**	**1,413**	**154**
Helena				
January	462	36	675	190
February	738	48	965	180
March	1,118	83	1,204	244
April	1,512	118	1,441	317
May	1,825	128	1,685	306
June	2,055	154	1,986	372
July	2,221	111	2,512	287
August	1,876	125	2,192	322
September	1,395	133	1,764	408
October	920	69	1,329	268
November	532	34	805	185
December	392	26	629	137
Annual Average	**1,256**	**29**	**1,435**	**103**
Kalispell				
January	396	37	338	155
February	644	62	606	211
March	986	111	929	280
April	1,379	106	1,237	278
May	1,711	131	1,488	302
June	1,943	168	1,775	395
July	2,117	147	2,322	352
August	1,777	165	2,017	433
September	1,283	159	1,579	480
October	788	87	1,026	320
November	406	27	383	103
December	313	21	265	78
Annual Average	**1,148**	**39**	**1,167**	**105**
Lewistown				
January	467	33	714	193
February	742	53	967	203
March	1,136	97	1,211	264
April	1,520	137	1,452	374
May	1,809	128	1,630	301
June	2,049	149	1,953	351
July	2,173	108	2,358	271
August	1,844	122	2,098	312
September	1,340	129	1,631	368
October	902	60	1,294	236
November	530	29	841	150
December	391	22	668	118
Annual Average	**1,244**	**29**	**1,404**	**104**
Miles City				
January	527	36	837	167
February	810	50	1,056	174
March	1,198	80	1,320	275
April	1,570	138	1,561	366
May	1,868	145	1,753	309
June	2,151	149	2,159	362
July	2,216	91	2,444	226
August	1,917	101	2,242	273
September	1,406	121	1,772	348
October	940	55	1,372	202
November	567	33	896	164
December	436	28	762	167
Annual Average	**1,303**	**32**	**1,517**	**107**
Missoula				
January	418	36	393	156
February	659	54	654	198
March	1,011	103	951	304
April	1,426	113	1,298	283
May	1,740	152	1,525	354
June	1,988	166	1,866	397
July	2,202	131	2,515	318
August	1,845	151	2,159	386
September	1,343	153	1,661	455
October	850	94	1,144	333
November	452	32	494	134
December	339	23	346	88
Annual Average	**1,192**	**35**	**1,254**	**95**

1 The standard deviations of solar radiation elements provide a measure of the interannual variability of monthly and annual averages. During 32 percent of the years, monthly and annual mean solar radiation is expected to fall outside the range of the average plus or minus the standard deviation.

NOTE: Data in the source document was presented in watt-hours per square meter. It was converted to Btu's per square foot by multiplying by 0.3172.

The National Renewable Energy Laboratory believes the uncertainty range around these data is conservatively estimated at 6 to 9 percent.

SOURCE: National Renewable Energy Laboratory, *Interim Solar Radiation Data Manual* (NREL/TP-463-5176).

Table 6.3. Ethanol Production and Gasohol Consumption, 1980-91 (gallons)

Year	Ethanol Production	Ethanol Exports	Percentage Exported	Gasohol Consumption[1]			Percentage of Gasoline Use[3]
				Montana Produced	Imported[2]	Total	
1980	15,700	0	0%	157,000	0	157,000	0.04%
1981	47,400	0	0	474,000	252,786[4]	726,786	0.17
1982	1,017,000	0	0	10,170,000	5,152,496	15,322,496	3.77
1983	1,132,600	0	0	11,326,000	3,835,304	15,161,304	3.62
1984	1,018,100	NA[5]	NA[5]	10,181,000	6,365,400	16,546,400	3.97
1985	1,078,496	649,996	60.3	4,285,000	6,771,862	11,056,862	2.74
1986	518,068	355,355	68.6	1,627,130	3,392,317	5,019,447	1.24
1987	844,774	553,848	65.6	2,909,260	2,046,087	4,955,347	1.22
1988	332,469	306,805	92.3	256,640	2,120,680	2,377,320	0.58
1989	854,892	847,057	99.1	78,350	2,664,796	2,743,146	0.67
1990	1,852,879	1,826,340	98.6	265,390	4,304,212	4,569,602	1.11
1991	1,884,638	1,849,315	98.1	353,230	5,674,761	6,027,991	NA

[1] Amount of gasohol estimated by source, based on Ethanol Inventory/Gasohol Blending Report and assuming a blend of 10 percent ethanol and 90 percent unleaded gasoline. Consumption figures include gasohol imported but not consumed in the reporting year.

[2] The ethanol imported to make this gasohol came from North Dakota, Wyoming, Idaho, and Canada.

[3] Percentage calculation based on Highway Use gasoline consumption data from Table 7.1.

[4] Consumption during July to December. Earlier data not available.

[5] Amount exported is believed to be negligible.

NOTE: These data are corrections of data previously presented in U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, 1981-90.

SOURCES: Montana Department of Revenue (1980-90); Montana Department of Transportation (1991).

Chapter 7: Transportation

The transportation sector is the single largest user of petroleum and the second largest user of all forms of energy in Montana. It is attracting increased attention because of recent federal legislation such as the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and growing public concern over the expense of roads and highways. Therefore, this chapter has been devoted to end-use data on one energy sector, transportation.

Motor Fuel Use

The fluctuations in demand for gasoline and diesel fuel since 1970 are due to a number of interrelated factors. The decline in gasoline and diesel demand in 1973-74 was a result of the oil embargo by the Organization of Petroleum Exporting Countries (OPEC) and the resulting increase in motor fuel prices. After the oil embargo, gasoline use climbed through 1978 as real prices stabilized, until higher fuel prices, a weakened economy and major advances in vehicle fuel efficiency combined to reduce gasoline demand from 1979 to 1983. Another factor contributing to the decline in gasoline demand was the fuel switch by heavy-duty trucks from gasoline to diesel. Since the early 1980s, the use of gasoline has essentially remained flat. The increase in total vehicle miles travelled in Montana has been offset by continued advances in vehicle fuel efficiency and retirement of older, less efficient vehicles.

Diesel use has continued to grow steadily, with only slight declines during the oil crises in 1973-74 and 1979. The increase in diesel use since the mid-1970s was due to the increased use of diesel in heavy-duty freight trucks and the rapid growth in highway freight transport. After the mid-1980s, growth in diesel use slowed somewhat once heavy-duty diesel trucks had replaced gasoline-powered trucks in the market. Continued growth in diesel demand is a result of increases in ton miles of freight transport, which tends to increase in proportion to Gross National Product.

Fuel efficiency of motor vehicles has improved significantly since 1975. Between 1975 and 1990, Corporate Average Fuel Economy (CAFE) ratings for new automobiles increased from 15.8 miles per gallon (MPG) to 28.1 MPG. A crude estimate of the in-use fuel efficiency of Montana's vehicle fleet, calculated by dividing total vehicle miles travelled (VMT) in Montana by total highway motor fuel use, reveals that average fuel economy of the vehicle fleet has increased from 11.09 MPG in 1975 to 15.54 MPG in 1990. Based on a similar calculation, the 1990 in-use fuel efficiency for the U.S. fleet is 16.32 MPG. The in-use efficiency estimate for Montana's vehicle fleet is lower than the CAFE ratings due to on-road factors such as cold weather driving, the age of the vehicle fleet, and the popularity of light trucks, which on the average have lower fuel economy than automobiles. The estimate is also lower due to the inclusion of heavy-duty truck VMT and fuel use. Another factor that influences on-road fuel efficiency is the volume of rural vs. urban VMT. The high percentage of rural driving in Montana exerts a positive influence on fleet fuel efficiency. Because a high percentage of VMT in the U.S. is on urban roads, the in-use fuel efficiency estimate for the U.S. is reduced.

Motor Fuel Prices

While the nominal prices of gasoline and diesel in the late 1980s and 1990 are at or near a twenty year high, the real price of gasoline since 1986 has been at or below the prices of the early 1970s, before the 1973-74 OPEC oil embargo. Real diesel prices are higher than those of the early 1970s but remain much lower than their peak in 1980-81.

The fluctuations in nominal gasoline and diesel prices since 1970 reflect trends in the world crude oil market. Wars in the Middle East, combined with efforts by OPEC to achieve a higher return for its resources, contributed to the rise in prices in the 1970s and in 1989-90. Worldwide economic slowdown, combined with efforts to conserve energy and replace oil with alternative fuels in response to the energy crisis of the 1970s, led to a decrease in the demand for petroleum in 1979 and early 1980s. The decreased demand for petroleum contributed to a glut in oil supplies and resulted in a decrease in the nominal price of gasoline and diesel in the early 1980s and again in 1986.

Monthly Gasoline Use and Prices

Figures for monthly gasoline use in Montana reflect regular seasonal fluctuations. More gasoline is sold in summer months when tourism is at a peak and weather is more conducive to travel. The higher gasoline prices in the late summer months are related to the increased demand for gasoline in the summer. The large increase in gasoline prices in the fall of 1990 was

a result of the Iraqi invasion of Kuwait and fears that the conflict could spread to Saudi Arabia.

Vehicle Registrations

There were 57 percent more vehicles registered in Montana in 1990 than in 1970. In 1990, 41 percent of total registrations in Montana were trucks, up from 35 percent in 1970. For the U.S., trucks made up only 17 percent of total registrations in 1970 and 24 percent in 1990. Most (77 percent) of the trucks registered in Montana are light trucks, mainly pickups, with a gross vehicle weight (GVW) under 8000 pounds.

While the popularity of light trucks in Montana is based in part on the use of trucks for agricultural activities and other work, the *1987 Census of Transportation, Truck Inventory and Use Survey* (U.S. Bureau of the Census), indicates that 60 percent of trucks registered in Montana in 1987 were used primarily for personal transportation, up from 35 percent in 1972.

The increase in popularity of light trucks for personal transportation in Montana is significant because the energy efficiency for light trucks, based on CAFE ratings, is 30 to 40 percent less than that of cars and has remained virtually unchanged since the early 1980s.

In Montana, close to 34 percent of passenger cars and light and heavy duty trucks registered in 1991 were over 12 years old. This is compared to 20 percent, in 1990, for the U.S. (Motor Vehicle Manufacturers Association, *Motor Vehicle Facts and Figures, 1991*). This is significant because older vehicles produce a disproportionate share of total U.S. vehicle air emissions and have lower overall fuel efficiency.

Vehicle Miles Travelled

Vehicle miles travelled (VMT) in Montana have nearly doubled since 1970. More than 75 percent of total VMT in Montana in 1990 were on rural roads and highways, up from 68 percent in 1980.

Transportation to Work

The average travel time to work in Montana's major cities is low compared to the national average. In 1990, the average travel time to work for Montana urban areas was 12.8 minutes, with the U.S. average at 22.4 minutes. The average commute time has increased only slightly from the 1980 average time of 12.6 minutes for the same urban areas.

Commuter transportation patterns in Montana's urban areas reflect a general dependence on single occupancy passenger vehicles and trucks. The number of persons per vehicle in Montana has declined from 1.16 in 1980 to 1.11 in 1990 (based on U.S. Census Bureau population figures). In 1990, more than 85 percent of the commute trips in Montana cities were in private vehicles. This percentage increased from 76 percent in 1980.

Table 7.1. Motor Fuel Use, 1950-90 (thousand gallons)

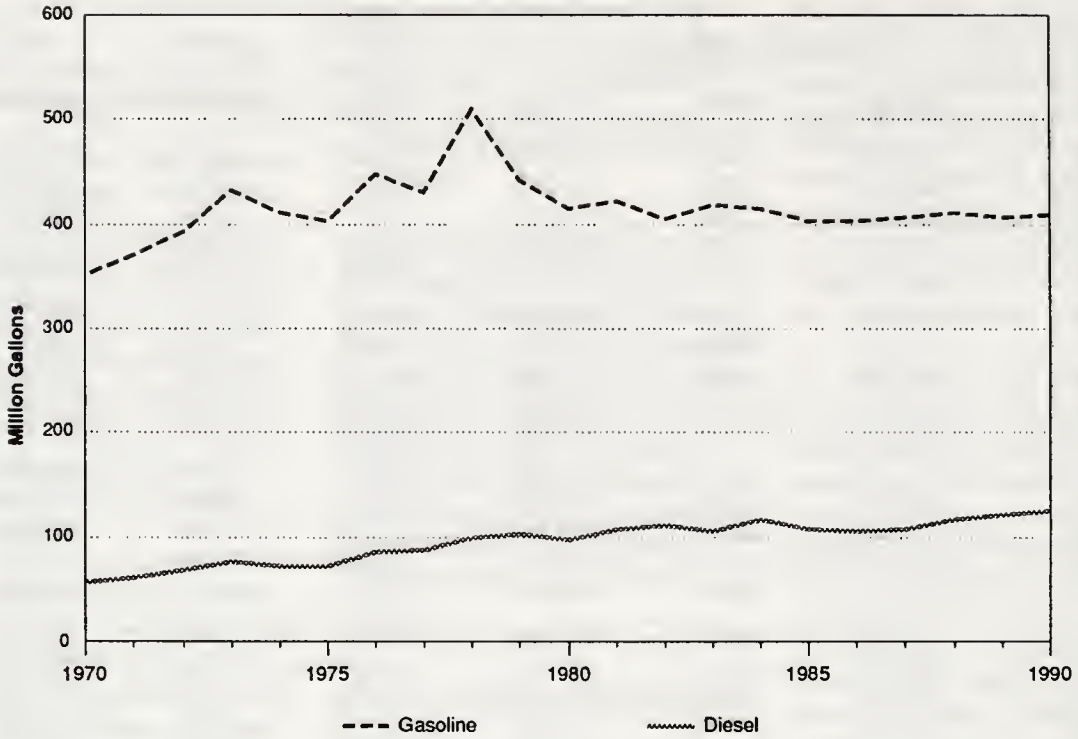
Year	Highway Use of Motor Fuel			Nonhighway Use of Motor Fuel (gasoline)	Losses Due to Evaporation, Handling, etc.	TOTAL CONSUMPTION OF MOTOR FUEL
	Gasoline	Diesel	Subtotal			
1950	169,162	7,593	176,755	52,994	3,486	233,235
1951	185,221	9,708	194,929	43,585	3,570	242,084
1952	188,254	12,385	200,639	57,533	3,864	262,036
1953	215,163	14,172	229,335	38,281	3,906	271,522
1954	204,579	16,990	221,569	58,832	4,032	284,433
1955	211,973	17,323	229,296	60,322	3,948	293,566
1956	233,910	17,662	251,572	53,373	4,326	309,271
1957	222,648	19,969	242,617	65,271	2,898	310,786
1958	239,541	21,547	261,088	50,097	2,940	314,125
1959	239,150	26,313	265,463	64,459	3,024	332,946
1960	242,430	27,216	269,646	69,974	3,150	342,770
1961	240,490	31,255	271,745	89,218	3,360	364,323
1962	274,043	30,311	304,354	41,413	3,654	349,421
1963	267,671	33,447	301,118	46,958	3,738	351,814
1964	273,144	35,294	308,438	42,657	3,612	354,707
1965	280,705	38,879	319,584	48,872	3,906	372,362
1966	269,659	43,253	312,912	40,736	3,780	357,428
1967	300,192	40,668	340,860	44,076	3,990	388,928
1968	321,429	45,756	367,185	40,607	4,032	411,824
1969	342,954	49,868	392,822	27,902	4,074	424,798
1970	352,654	58,136	410,790	39,654	4,242	454,686
1971	372,174	61,295	433,469	33,345	4,242	471,056
1972	394,482	69,145	463,627	42,185	4,368	510,180
1973	432,272	76,964	509,226	35,933	4,662	549,821
1974	412,004	72,955	484,959	31,842	4,452	521,253
1975	404,957	72,682	477,639	45,256	4,494	527,389
1976	449,092	87,051	536,143	46,148	4,998	587,289
1977	431,617	89,381	520,998	42,667	4,452	568,117
1978	511,119	100,375	611,494	38,123	5,208	654,825
1979	443,580	103,756	547,336	44,112	5,250	596,698
1980	416,511	98,615	515,126	40,788	4,662	560,576
1981	423,780	108,849	532,629	44,001	4,704	581,334
1982	406,462	110,864	517,326	40,371	4,410	562,107
1983	418,919	105,234	524,153	33,306	4,494	561,953
1984	416,324	117,012	533,336	34,828	–	568,164
1985	403,929	109,043	512,972	37,675	–	550,647
1986	404,386	107,192	511,578	36,006	–	547,584
1987	407,673	108,341	516,014	33,187	–	549,201
1988	412,126	117,389	529,515	33,710	–	563,225
1989	408,306	120,917	529,223	35,714	–	564,937
1990	410,718	125,346	536,064	36,646	–	572,710

NOTE: Motor fuel is defined as all gasoline covered by state motor fuel tax laws plus diesel fuel and LPG used in the propulsion of motor vehicles. Gasohol is included with gasoline. Military use of motor fuel and aviation jet fuel use are excluded in the Department of Transportation data. Figures for highway use of fuels may be understated because of refunds given on fuel for nonhighway use such as agriculture.

Starting in 1984, losses due to evaporation and handling are no longer calculated by FHWA. Total consumption of motor fuel from 1984-90, therefore, does not include this figure. To compare the total for these years to the total for the previous years, the losses should be subtracted from the 1950-83 total consumption column.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, annual reports, 1950-90.

Figure 7.1. Highway Motor Fuel Use, 1970-90



SOURCE: Table 7.1.

Table 7.2. Estimated Price of Motor Fuel and Motor Fuel Taxes, 1970-90

YEAR	Motor Gasoline ($/gallon)	State Gasoline Tax (¢/gallon)	Date Changed	Federal Gasoline Tax (¢/gallon)	Date Changed	Diesel ($/gallon)	State Diesel Tax (¢/gallon)	Date Changed	Federal Diesel Tax (¢/gallon)	Date Changed
1970	0.36	7		4		0.21	9		4	
1971	0.37	7		4		0.22	9		4	
1972	0.35	7		4		0.22	9		4	
1973	0.40	7		4		0.25	9		4	
1974	0.54	7		4		0.40	9		4	
1975	0.60	7.75	June 1	4		0.41	9.75	June 1	4	
1976	0.61	7.75		4		0.42	9.75		4	
1977	0.66	8	July 1	4		0.47	10	July 1	4	
1978	0.69	8		4		0.49	10		4	
1979	0.88	9	July 1	4		0.71	11	July 1	4	
1980	1.07	9		4		1.03	11		4	
1981	1.31	9		4		1.20	11		4	
1982	1.30	9		4		1.17	11		4	
1983	1.15	15	July 1	9	April 1	0.99	17	July 1	9	April 1
1984	1.16	15		9		1.00	17		15	Aug. 1
1985	1.16	15		9		0.94	17		15	
1986	0.90	17	Aug. 1	9		0.95	17		15	
1987	0.98	20	July 1	9.1	Jan. 1	0.99	20	July 1	15.1	Jan. 1
1988	0.99	20		9.1		1.02	20		15.1	
1989	1.10	20		9.1		1.13	20		15.1	
1990	1.22	20		14.1	Dec. 1	1.28	20		20.1	Dec. 1

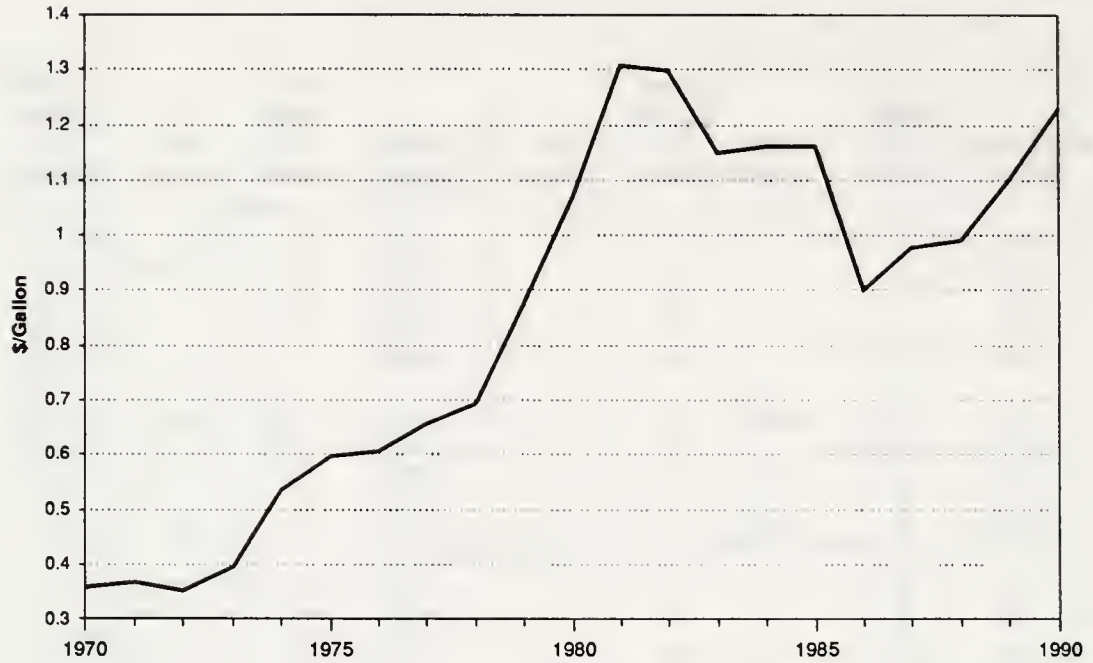
NOTES: Price is average of all grades. All prices except 1984-90 gasoline prices are derived from the *State Energy Price and Expenditure Report*, which reports prices in $/million Btu. Gasoline and diesel prices listed include state and federal per gallon fuel taxes. The source document omits federal diesel fuel tax from 1970-82. Therefore, federal tax has been added to the 1970-82 diesel prices listed above. Prices are in nominal dollars.

SOURCES: Gasoline prices for 1984-90 are from U.S. Department of Energy, Energy Information Administration, *Petroleum Marketing Annual*, Refiner/Reseller Motor Gasoline Prices by Grade, Sales to End Users Through Company Outlets, annual reports, 1985-90 (EIA-0487).

All other fuel prices are from U.S. Department of Energy, Energy Information Administration, *State Energy Price and Expenditure Report*, annual reports, 1970-82, 1990 (EIA-0376) .

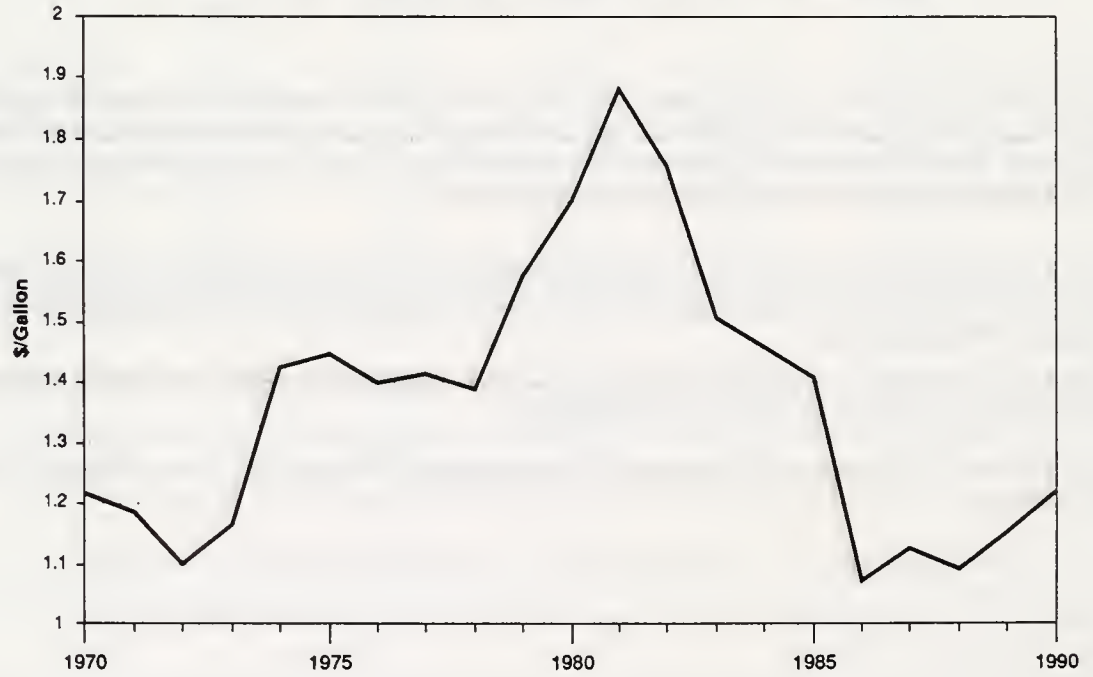
Tax figures are from U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, annual reports, 1970-90.

Figure 7.2. Nominal Gasoline Prices, 1970-90



SOURCE: Table 7.2.

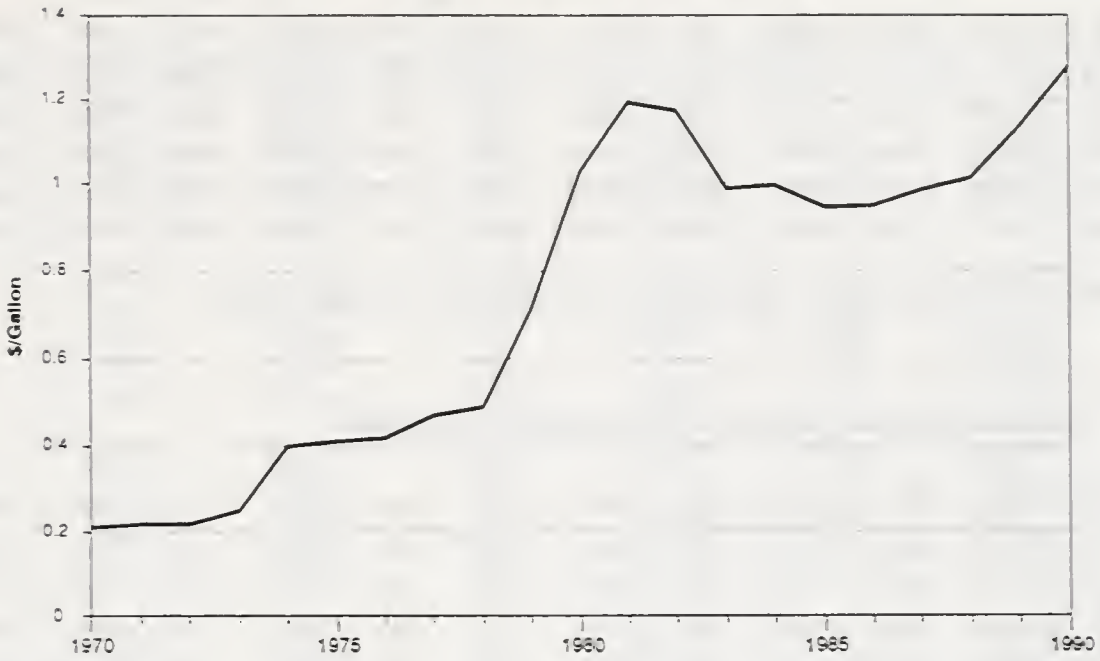
Figure 7.3. Real Gasoline Prices, 1970-90 (1990 dollars)



NOTE: Nominal dollars converted to real dollars using Consumer Price Index, Table 8.4.

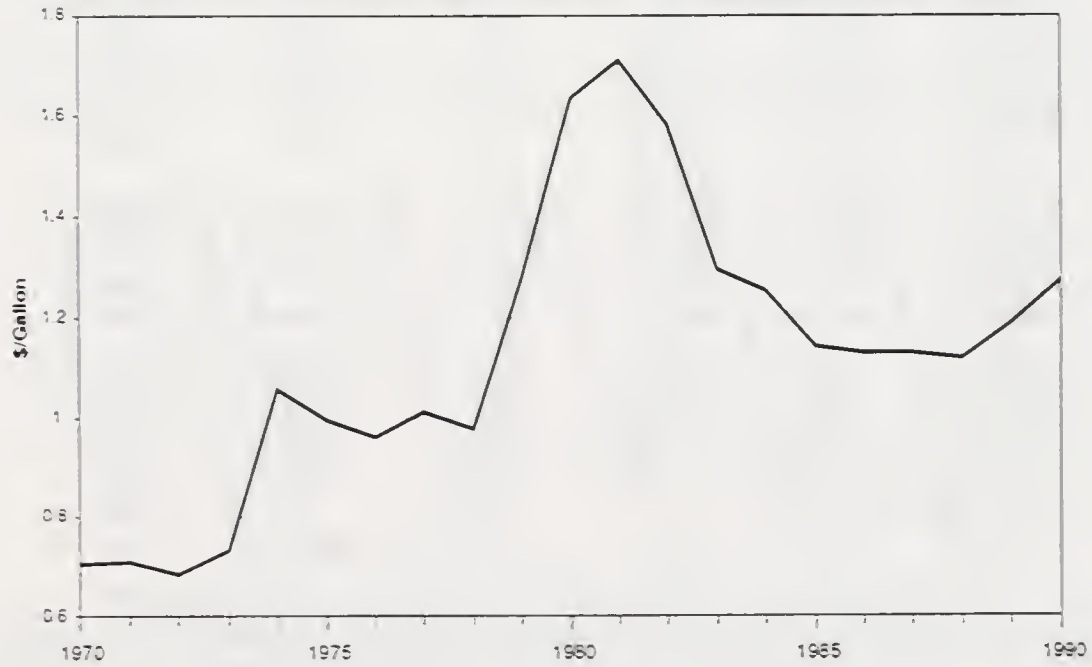
SOURCE: Table 7.2.

Figure 7.4. Nominal Diesel Prices, 1970-90



SOURCE: Table 7.2.

Figure 7.5. Real Diesel Prices, 1970-90 (1990 dollars)



NOTE: Nominal dollars converted to real dollars using Consumer Price Index, Table 8.4.

SOURCE: Table 7.2.

Table 7.3. Highway Use of Gasoline by Month, 1986-90 (thousand gallons)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1986	26,002	23,576	30,612	30,976	35,829	40,074	44,483	44,321	35,869	34,656	28,711	29,277	**404,386**
1987	26,499	26,091	29,923	32,084	35,549	39,340	42,316	43,991	36,975	34,733	30,657	29,515	**407,673**
1988	27,118	27,035	32,146	32,393	37,008	40,141	41,996	41,007	36,473	36,020	30,662	30,127	**412,126**
1989	26,010	24,784	31,398	32,093	36,625	38,585	43,198	42,423	36,176	35,360	30,664	30,990	**408,306**
1990	28,422	26,738	31,338	33,391	36,636	39,716	42,550	42,181	36,307	34,665	31,091	27,683	**410,718**

SOURCE: Federal Highway Administration, *Highway Statistics*, Table MF-26, annual reports, 1986-90.

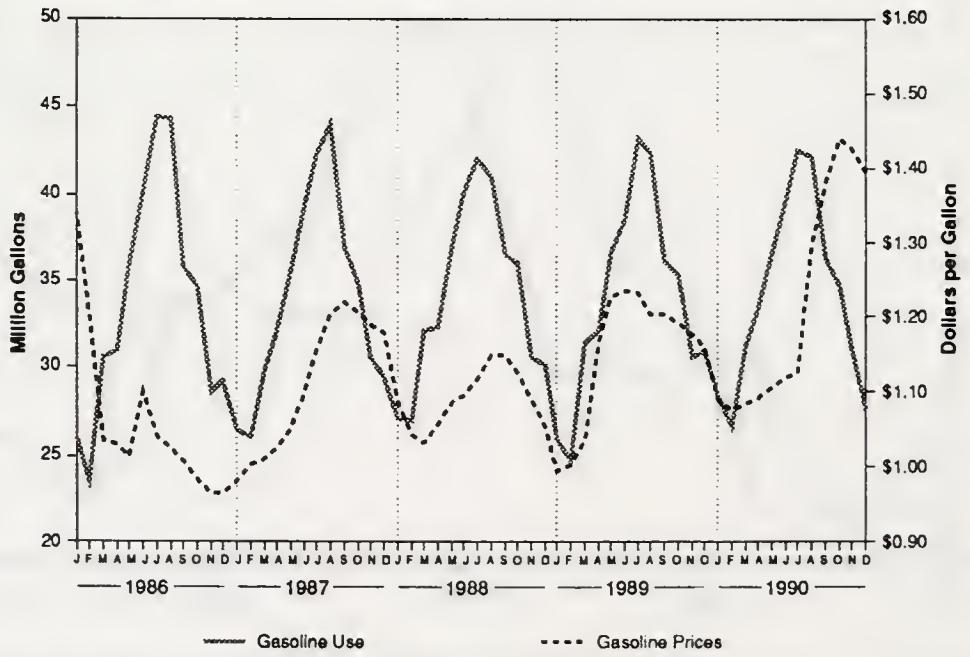
Table 7.4. Gasoline Prices by Month, 1986-90 (dollars per gallon)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVERAGE PRICE
1986	1.13	1.01	0.87	0.86	0.85	0.92	0.87	0.86	0.85	0.83	0.81	0.81	**0.90**
1987	0.86	0.87	0.88	0.89	0.92	0.95	1.00	1.05	1.06	1.05	1.04	1.02	**0.98**
1988	0.99	0.95	0.94	0.96	0.99	0.99	1.01	1.04	1.04	1.02	0.99	0.95	**0.99**
1989	0.95	0.95	0.98	1.11	1.16	1.17	1.17	1.14	1.14	1.13	1.12	1.10	**1.10**
1990	1.09	1.08	1.08	1.09	1.11	1.12	1.13	1.30	1.38	1.44	1.43	1.39	**1.22**

NOTE: Gasoline prices include federal and state motor fuel tax. Prices are in nominal dollars.

SOURCE: U.S. Department of Energy, Energy Information Administration, *Petroleum Marketing Annual*, Refiner/Reseller Motor Gasoline Prices to End-Users by Grade, Motor Gasoline Average Through Company Outlets, annual reports, 1986-90 (EIA-0487).

Figure 7.6. Monthly Gasoline Use and Prices, Seasonal Trend, 1986-90



NOTE: Prices are in 1990 dollars (Index = CPI; Table 8.4).

SOURCE: Tables 7.3 and 7.4.

Table 7.5. State Motor Vehicle Registrations, 1950-90

Year	Automobiles	Buses	Trucks	Motorcycles	TOTAL
1950	181,567	924	82,401	1,223	266,115
1951	188,854	873	86,094	1,122	276,943
1952	192,339	974	86,277	970	280,560
1953	202,883	1,127	94,646	1,048	299,704
1954	210,796	1,156	97,485	1,125	310,562
1955	227,699	1,249	102,119	1,186	332,253
1956	234,989	1,370	105,138	1,276	342,773
1957	241,554	1,314	107,310	1,496	351,674
1958	241,805	1,335	109,123	1,795	354,058
1959	252,484	1,202	114,384	2,276	370,346
1960	256,529	1,175	115,325	2,518	375,547
1961	260,547	1,197	117,176	3,123	382,043
1962	268,504	1,242	122,318	4,863	396,927
1963	278,225	1,343	127,955	7,480	415,003
1964	283,154	1,314	131,593	9,503	425,564
1965	290,222	1,225	137,976	12,112	441,535
1966	294,258	1,388	143,500	13,776	452,922
1967	300,214	1,562	149,561	15,529	466,866
1968	303,964	1,684	157,696	17,032	480,376
1969	311,975	1,773	164,386	19,676	497,810
1970	312,691	1,712	170,587	24,765	509,755
1971	328,026	1,677	180,993	29,958	540,654
1972	342,070	1,738	194,716	34,678	573,202
1973	356,375	1,731	208,950	36,856	603,912
1974	363,107	1,732	220,491	39,692	625,022
1975	374,614	1,767	235,106	39,225	650,712
1976	391,428	1,787	245,738	38,580	677,533
1977	448,818	2,077	274,615	46,784	772,294
1978	518,170	2,208	306,118	54,051	880,547
1979	414,254	2,919	248,808	29,584	695,565
1980	419,700	2,075	257,757	34,636	714,168
1981	425,767	2,173	308,212	38,085	774,237
1982	451,097	2,267	304,560	43,675	801,599
1983	486,294	1,701	340,742	33,787	862,524
1984	405,716	1,745	277,401	30,112	714,974
1985	394,510	1,865	255,807	25,897	678,079
1986	433,234	1,849	237,464	27,912	700,459
1987	415,728	1,864	232,170	25,491	675,253
1988	430,072	1,939	290,543	26,126	748,680
1989	441,264	1,967	297,966	26,813	768,010
1990	457,263	2,355	323,535	21,994	805,147

NOTE: Prior to 1979, motor vehicle registration figures were based on estimates. The use of automated county vehicle registrations in 1979 and later provides more accurate registration figures and likely explains the large discrepancy between the 1978 and 1979 figures.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, Table MV-1, annual reports, 1950-90.

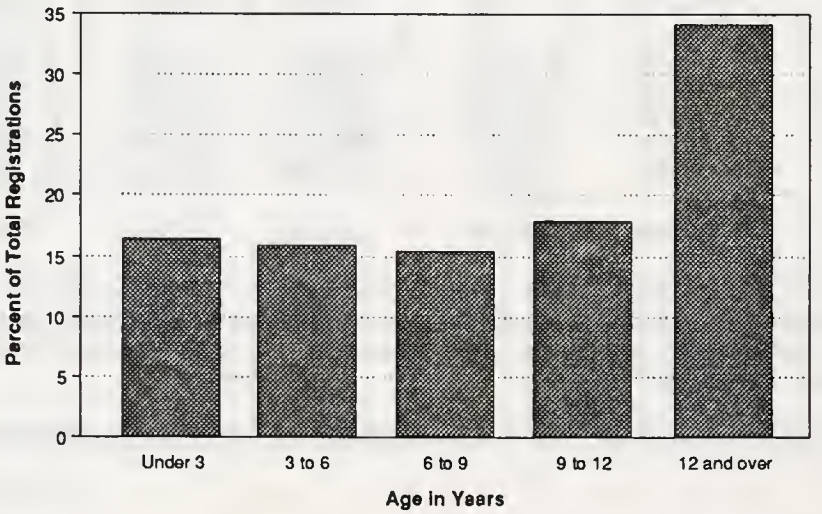
Table 7.6. Vehicle Registrations by Type of Vehicle and Year of Make (1991 registrations)

Year of Make	Passenger Cars (gasoline)	Passenger Cars (diesel)	Light Duty Trucks 1 (gasoline)	Light Duty Trucks 1 (diesel)	Light Duty Trucks 2 (gasoline)	Light Duty Trucks 2 (diesel)	Heavy Duty Trucks (gasoline)	Heavy Duty Trucks (diesel)	Motorcycles	TOTAL
1992	2,770	19	1,541	120	11	3	10	17	49	**4,540**
1991	26,103	165	9,842	825	66	19	97	141	499	**37,757**
1990	27,987	113	10,511	899	88	19	53	45	580	**40,295**
1989	29,283	98	11,903	687	136	19	51	41	670	**42,888**
1988	29,538	75	10,659	489	67	13	37	41	673	**41,592**
1987	27,361	87	8,409	421	44	8	36	18	819	**37,203**
1986	27,894	220	11,774	876	45	21	42	11	1,098	**41,981**
1985	28,751	400	10,470	1,083	30	5	21	24	1,045	**41,829**
1984	28,112	901	10,853	1,370	29	4	17	15	1,251	**42,552**
1983	20,839	1,085	8,602	1,308	23	5	18	5	1,587	**33,472**
1982	17,682	1,497	7,595	1,467	45	10	22	6	2,152	**30,476**
1981	19,839	1,485	8,329	607	82	3	48	10	2,068	**32,471**
1980	20,490	538	8,737	323	77	2	38	7	1,735	**31,947**
1979	23,900	497	15,605	394	204	3	61	8	1,117	**41,789**
1978	22,282	111	13,727	287	206	1	45	12	1,332	**38,003**
1977	18,792	39	12,482	164	221	5	56	5	673	**32,437**
1976	14,544	48	11,610	130	201	1	78	6	729	**27,347**
1975	9,212	34	8,466	127	164	2	89	5	874	**18,973**
1974	10,061	18	9,217	155	156	1	57	4	698	**20,367**
1973	9,726	13	9,104	145	147	6	78	10	638	**19,867**
1972	7,874	4	7,439	108	160	0	58	2	558	**16,203**
1971	5,723	5	5,411	81	126	1	59	8	465	**11,879**
1970	5,215	2	5,368	74	121	0	64	7	286	**11,137**
1969	4,572	0	4,953	74	95	0	51	6	174	**9,925**
1968	3,843	0	3,912	46	69	1	52	3	120	**8,046**
1967	3,462	1	3,463	43	68	1	56	4	84	**7,182**
1966	3,246	0	3,338	53	67	2	36	1	74	**6,817**
1965	2,566	0	2,709	32	57	0	34	0	54	**5,452**
<1965	9,995	8	15,656	135	264	1	346	11	297	**26,713**
TOTAL	**461,662**	**7,463**	**251,685**	**12,523**	**3,069**	**156**	**1,710**	**473**	**22,399**	**761,140**

NOTE: Light Duty Trucks 1 are trucks under 6000 pounds GVW. Light Duty Trucks 2 are trucks between 6000 and 8500 GVW, inclusive. Heavy Duty Trucks are trucks weighing over 8500 pounds GVW. This series does not include buses. Figures are based on license plate types. Vehicles with special plates, such as personalized plates, and some commercial vehicles are not included; these represent about 5 percent of total registrations.

SOURCE: Montana Department of Justice, Motor Vehicle Division.

Figure 7.7. Percent of Vehicles by Age Group (1991 registrations)



SOURCE: Table 7.6.

Table 7.7. Vehicle Miles Travelled (VMT) by Functional Class of Highway, 1980-90 (in millions)

	RURAL							URBAN						
Year	Inter-state	Other Principal Arterial	Minor Arterial	Major Collector	Minor Collector	Local	Sub-Total	Inter-state	Other Principal Arterial	Minor Arterial	Collector	Local	Sub-Total	TOTAL
1980	1,318	1,154	875	492	133	569	4,541	96	492	328	148	1,018	2,082	**6,623**
1981	1,328	1,337	935	562	149	599	4,910	114	657	316	148	857	2,092	**7,002**
1982	1,313	1,309	834	588	135	616	4,795	122	653	286	114	699	1,874	**6,669**
1983	1,356	1,357	883	700	172	647	5,115	131	679	307	129	820	2,066	**7,181**
1984	1,389	1,381	869	882	212	563	5,296	140	725	337	147	741	2,090	**7,386**
1985	1,452	1,375	913	905	224	544	5,413	140	626	327	149	917	2,159	**7,572**
1986	1,490	1,385	933	861	309	769	5,747	142	620	332	148	748	1,990	**7,737**
1987	1,573	1,420	911	894	329	822	5,949	149	648	352	213	763	2,125	**8,074**
1988	1,651	1,442	957	915	341	789	6,095	153	656	384	170	680	2,043	**8,138**
1989	1,731	1,458	1,036	935	318	778	6,256	168	692	403	171	560	1,994	**8,250**
1990	1,816	1,482	1,094	894	320	754	6,360	165	734	350	185	538	1,972	**8,332**

NOTE:This table summarizes the state's estimated highway travel based on traffic counts taken along selected street and highway sections. Streets and highways are classified into groups called functional systems according to the character of service they are intended to provide. The functional systems are: 1) arterial highways, which generally handle the long trips; 2) collector facilities, which collect and disperse traffic between the arterials and the bottom level; and 3) local roads and streets, which serve the residential areas, individual farms, and other local areas.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, Table VM-2, annual reports, 1980-90.

Table 7.8. Vehicle Miles Travelled (VMT) by Federal-Aid System, 1970-90 (in millions)

	Federal-Aid System									Non-Federal-Aid			
	Interstate			Other Primary			Secondary						
Year	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	TOTAL
1970	905	53	958	1,560	282	1,842	477	67	544	923	600	1,523	**4,867**
1975	1,117	67	1,184	1,673	260	1,933	471	—	471	1,076	625	1,701	**5,298**
1980	1,318	96	1,414	2,020	187	2,207	408	642	1,050	795	1,157	1,952	**6,623**
1981	1,328	114	1,442	2,216	447	2,663	508	537	1,045	858	994	1,852	**7,002**
1982	1,313	122	1,435	2,126	418	2,544	423	523	946	933	811	1,744	**6,669**
1983	1,356	131	1,487	2,222	401	2,623	504	574	1,078	1,033	960	1,993	**7,181**
1984	1,389	140	1,529	2,233	428	2,661	468	624	1,092	1,206	898	2,104	**7,386**
1985	1,452	140	1,592	2,270	369	2,639	480	576	1,056	1,211	1,074	2,285	**7,572**
1986	1,490	142	1,632	2,299	372	2,671	456	607	1,063	1,502	869	2,371	**7,737**
1987	1,573	149	1,722	2,313	382	2,695	510	665	1,175	1,553	929	2,482	**8,074**
1988	1,651	153	1,804	2,389	395	2,784	805	693	1,498	1,250	802	2,052	**8,138**
1989	1,731	168	1,899	2,478	392	2,870	722	757	1,479	1,325	677	2,002	**8,250**
1990	1,816	165	1,981	2,572	463	3,035	738	680	1,418	1,234	664	1,898	**8,332**

NOTE: Federal-Aid Systems are segments of roads eligible for Federal aid. Federal-Aid Systems generally correspond to the highways functionally classified as arterials and major collectors. The Primary System includes the Interstate System as well as other "main" highways eligible for federal aid. The Interstate System connects the nation's principal metropolitan areas, cities, and industrial centers. The Federal-Aid Secondary System is composed of principal secondary and feeder roads linking farms, distribution outlets, and smaller communities with the Primary System.Travel for all systems other than Interstate are based on FHWA estimates.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, Table VM-3, annual reports, 1970-90.

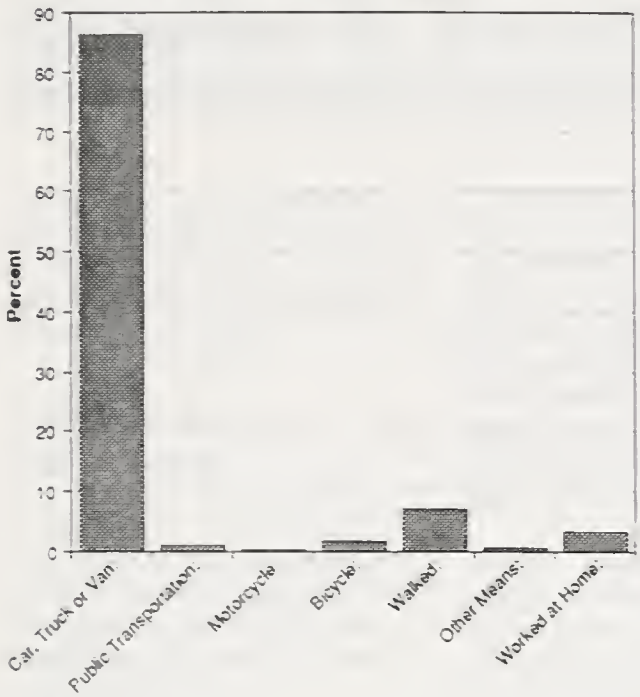
Table 7.9. Transportation to Work by Mode, 1990

	Billings	Bozeman	Butte-Silver Bow	Great Falls	Helena	Missoula
Means of Transportation to Work:						
Car, Truck or Van:						
Drove Alone	31,547	6,846	10,627	19,510	8,905	14,416
Carpooled	3,625	1,203	1,638	2,369	1,186	1,929
Public Transportation:						
Bus or Trolley Bus	451	39	38	232	46	301
Railroad	0	0	0	8	0	0
Taxicab	60	12	6	28	20	6
Motorcycle	29	29	27	52	28	65
Bicycle	172	453	37	199	178	793
Walked	1,779	1,858	872	1,173	1,276	1,638
Other Means	247	66	47	137	12	133
Worked at Home	1,182	477	440	663	471	626
Total Workers:	39,092	10,983	13,732	24,371	12,122	19,907
Private Vehicle Occupancy:						
Car, Truck, or Van						
Drove Alone	31,547	6,846	10,627	19,510	8,905	14,416
In 2-Person Carpool	3,125	1,014	1,234	2,127	1,023	1,595
In 3-Person Carpool	377	162	199	173	93	247
In 4-Person Carpool	62	18	93	45	43	49
In 5-Person Carpool	26	0	49	12	20	24
In 6-Person Carpool	6	0	22	7	0	8
In 7-Person Carpool	29	9	41	5	7	6
Other Means	3,926	2,934	1,467	2,498	2,031	3,562
Travel Time to Work:						
Did Not Work at Home:						
0 - 4 Minutes	1,424	922	874	996	852	1,172
5 - 9 Minutes	7,151	3,756	3,458	5,115	3,874	5,116
10 - 14 Minutes	11,443	3,166	4,133	7,979	3,919	5,933
15 - 19 Minutes	9,358	1,296	2,445	6,079	1,726	3,919
20 - 24 Minutes	4,899	568	789	1,972	570	1,448
25 - 29 Minutes	795	162	242	328	112	374
30 - 34 Minutes	1,394	318	366	561	237	659
35 - 39 Minutes	108	3	91	62	83	60
40 - 44 Minutes	110	42	123	18	20	44
45 - 59 Minutes	359	103	304	234	103	194
60 - 89 Minutes	310	63	285	163	78	187
90 or More Minutes	565	107	182	207	77	175
Worked at Home:	1,182	477	440	663	471	626
Mean Travel Time to Work:	15 Minutes	11 Minutes	14 Minutes	13 Minutes	11 Minutes	13 Minutes
Time Leaving Home to Go to Work:						
Did Not Work at Home:						
12:00 A.M. - 4:49 A.M.	687	183	221	520	134	387
5:00 A.M. - 5:29 A.M.	519	77	210	354	103	77
5:30 A.M. - 5:59 A.M.	760	188	348	619	200	391
6:00 A.M. - 6:29 A.M.	1,508	307	594	827	249	659
6:30 A.M. - 6:59 A.M.	3,138	542	1,245	2,023	981	1,340
7:00 A.M. - 7:29 A.M.	5,953	1,189	1,109	3,458	1,592	2,291
7:30 A.M. - 7:59 A.M.	8,998	2,498	2,973	5,667	3,752	4,289
8:00 A.M. - 8:29 A.M.	4,844	1,530	1,805	2,851	1,702	2,622
8:30 A.M. - 8:59 A.M.	2,179	632	918	1,546	516	1,321
9:00 A.M. - 9:59 A.M.	1,933	651	1,019	1,566	525	1,465
10:00 A.M - 10:59 A.M.	883	342	480	504	247	582
11:00 A.M. - 11:59 A.M.	661	205	250	374	210	277
12:00 P.M. - 3:59 P.M.	2,874	926	1,032	1,572	709	1,639
4:00 P.M. - 11:59 P.M.	2,979	1,236	1,088	1,833	731	1,941
Worked at Home:	1,182	477	440	663	471	626

SOURCE: U.S. Bureau of Census, 1990 Census of Population and Housing Summary — Population: Transportation To and Place of Work. Compiled by Montana Department of Commerce, Census and Economic Information Center.

Fgure 7.8. Means of Transportation to Work

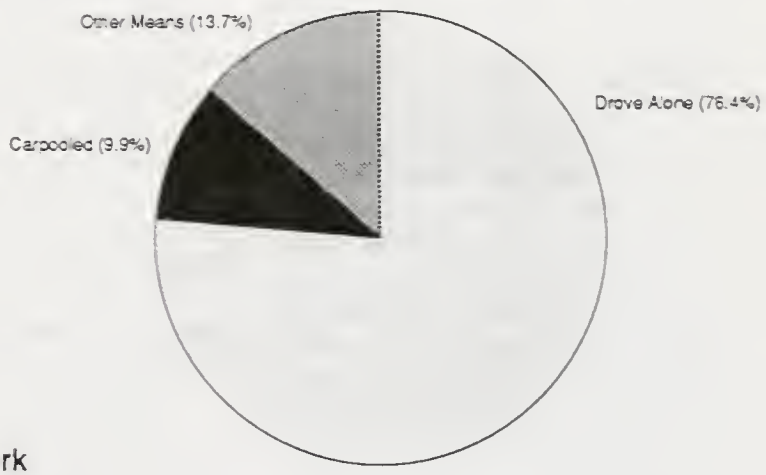
Major Montana Cities Combined, 1990



SOURCE: Table 7.9.

Fgure 7.9. Private Vehicle Occupancy

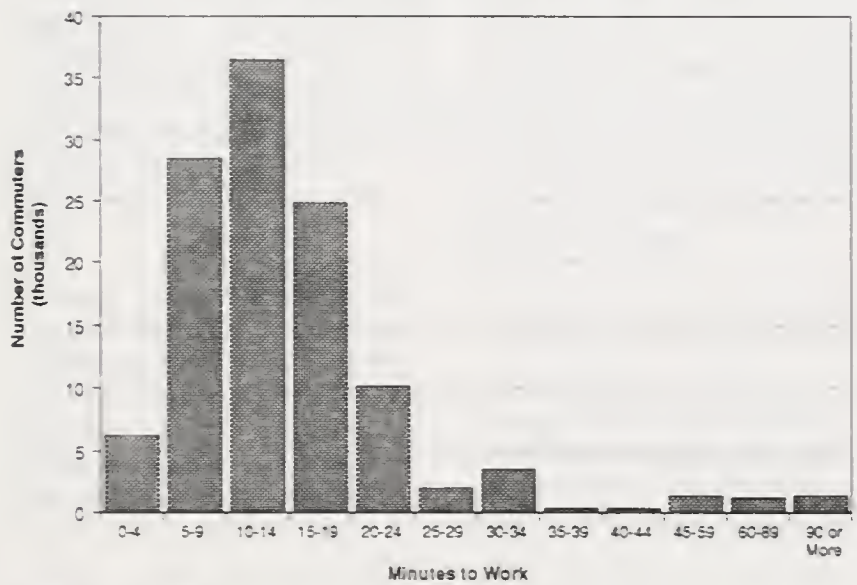
Major Montana Cities Combined, 1990



SOURCE: Table 7.9.

Fgure 7.10. Travel Time to Work

Major Montana Cities Combined, 1990



SOURCE: Table 7.9.

Chapter 8: Background Data

Energy production and consumption can only be understood within the context in which they occur. This chapter contains four tables of data that provide part of that context.

Montana Tax Collections

Energy production and consumption are affected, in part, by government policy. In Montana, taxes on energy production and consumption figure significantly in the revenue of state and local governments.

Taxes, which are collected almost entirely by the Department of Revenue (DOR), account for most of the income state government received from Montanans and Montana companies. The major exceptions are fees such as those collected by the universities and the Department of Fish, Wildlife, and Parks. Taxes on energy production, such as the severance taxes on coal, natural gas and oil, and on energy consumption, such as the gasoline and diesel fuel taxes, make up a substantial percentage of DOR collections. In the first half of the 1980s, those energy taxes accounted for around 45 percent of DOR collections. This figure dropped to 31 percent in Fiscal Year 1992.

The major energy taxes are the coal and oil severance taxes and the gasoline and diesel fuel taxes. In Fiscal Year 1992, coal severance accounted for 7 percent of DOR collections, oil severance 2 percent, gasoline 14 percent, and diesel fuel 4 percent.

Coal severance tax collections dropped after 1988, primarily in response to reductions in severance tax rates. Oil severance tax collections have been particularly volatile, reflecting the international market for oil; these collections now are at a decade low. Gasoline and diesel fuel tax collections have climbed steadily, driven by increasing tax rates.

Property taxes are major sources of income for local governments and school districts. Net and gross proceeds taxes are property taxes levied on coal, natural gas, and oil production. Facilities for energy production and transmission also are sources of property tax revenue. Those yielding the most revenue are the electric generating plants, electric transmission lines and natural gas pipelines of investor-owned utilities. These energy-related categories of property plus the proceeds taxes accounted for 21 percent of the property taxes collected in Montana in Fiscal Year 1992. This percentage has varied between 18 and 25 percent between 1982 and 1992. During this time, collections from the proceeds tax dropped, while property tax collections from investor-owned utilities increased. A significant portion of the increase was due to the completion of Colstrip Units 3 and 4, and associated facilities.

Heating Degree Days

Heating degree days (HDD) are a measure of how cold a location is. That dictates how much energy is required to keep a building warm. And that in turn influences the cost-effectiveness of insulation and other energy conservation measures. Northwest Montana is the warmest part of the state, with average annual heating degree day totals as low as 6,710, at Thompson Falls. Coldest spots on average are West Yellowstone (10,956 HDD) and Cooke City (11,961 HDD). Average HDD for most of the major population centers cluster around 8,000, though the range runs from 7,164 HDD at Billings to 9,517 HDD at Butte.

Residential Fuel Choice

Residential fuel choice determines what demands will be placed on fuel suppliers and what conservation possibilities exist. Natural gas is used in most Montana residences. Fifty four percent of Montana residences used gas in 1990, down from a high of 70 percent in 1970. During that same period, electricity increased its share of primary heating systems from 4 percent to 18 percent of residences. Wood also increased its share, from 2 percent to 15 percent. Most houses using wood have a backup heating system, usually electric resistance heat.

Economic Indices

The change in energy prices over time is a concern of consumers and producers alike. Part of that change is due to inflation in the overall economy, and not to real changes in the price of a product or service. Indices such as the Consumer Price Index (CPI) and the Implicit Price Deflator can be used

to eliminate the effects of inflation on prices. The CPI is based on survey data and measures changes in the retail prices of a "market basket" of commonly purchased goods and services. It is most appropriately used to interpret prices paid by consumers, such as residential gas and electric bills. The Deflator is based on production and consumption data in the National Income Accounts and reflects changes in the actual consumption pattern within the overall economy. It is most appropriately used to interpret production costs and the performance of the economy as a whole. As a practical matter, both indices have indicated about the same rate of inflation over the last three decades. They show that since 1981, inflation has caused prices to increase about 50 percent on average.

Table 8.1. Montana Energy Tax Collections, Fiscal Years 1981-92 (nominal dollars)

	FISCAL YEAR											
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992[1]
Department of Revenue (DOR) Collections												
Aviation Fuel Tax	386,790	323,510	325,187	347,762	324,051	320,791	315,058	327,252	374,046	336,530	337,764	386,047[2]
Coal Severance Tax	70,415,018	86,186,886	80,044,981	82,823,431	91,748,856	84,217,223	76,546,601	84,638,332	58,565,583	67,870,544	50,457,839	43,434,111
Consumer Counsel Tax	396,998	561,081	440,605	691,166	761,809	811,769	444,816	407,471	723,724	693,334	751,571	842,961[2]
Diesel Fuel Tax	11,705,212	11,697,235	11,877,324	17,793,066	19,278,727	18,576,576	17,541,396	21,185,520	23,702,390	23,821,548	22,797,863	26,268,693
Electrical Producers Tax	1,367,959	1,753,173	1,546,157	2,413,172	2,361,855	2,530,403	2,991,861	3,311,082	3,815,964	4,100,543	3,906,194	4,128,519[2]
Gasoline License Tax	36,857,986	37,395,507	36,687,189	61,088,589	61,880,197	60,481,888	67,631,602	80,889,296	83,951,441	87,893,465	87,110,555	90,421,623
Natural Gas Severance Tax	2,116,291	2,659,811	2,649,726	2,797,996	2,945,778	2,890,666	2,492,425	1,491,523	1,724,735	1,057,277	1,277,368	1,112,778
Oil and Gas Producers Tax	—	319,720	338,069	755,245	752,911	630,899	687,284	929,284	789,045	877,825	978,223	904,384
Oil Severance Tax	19,578,173	51,073,425	45,228,535	49,029,017	48,789,984	34,728,749	16,143,592	16,484,059	13,234,516	14,510,149	18,885,901	16,171,115
Public Service Regulation Tax	—	—	—	—	—	—	1,649,293	2,085,218	2,224,363	1,571,594	1,206,887	1,934,214
Resource Indemnity Tax - Coal	825,496	1,000,195	1,897,861	1,300,665	-199,370	1,171,480	1,090,324	1,224,129	1,356,240	2,540,363	1,305,588	1,658,060
Resource Indemnity Tax - Natural Gas	419,647	491,832	537,871	589,348	627,504	583,961	538,251	484,357	539,442	453,052	436,080	392,289
Resource Indemnity Tax - Oil	3,328,426	5,308,525	4,783,438	4,279,714	4,204,763	3,913,955	1,859,932	2,033,646	1,627,445	1,795,586	2,120,447	1,722,235
TOTAL Energy Taxes[3]	**147,397,996**	**198,770,900**	**186,356,943**	**223,909,171**	**233,477,065**	**210,858,360**	**189,932,435**	**215,491,169**	**192,628,934**	**207,521,810**	**191,572,280**	**189,377,020**
TOTAL DOR Collections[4]	**$385,527,987**	**$429,218,049**	**$414,869,653**	**$472,179,359**	**$521,404,095**	**$486,826,230**	**$462,237,845**	**$555,485,141**	**$570,648,348**	**$622,108,424**	**$606,428,773**	**$664,586,626**
Property Taxes on Fuel Production and Selected Energy Facilities												
Net/Gross Proceeds Tax												
Coal	9,770,941	11,331,711	13,084,246	12,714,586	13,297,292	14,435,277	15,695,344	14,111,655	13,499,312	13,760,962	12,467,015	13,148,124
Oil- Old Production[5]	29,191,371	46,636,533	64,551,576	65,610,581	60,818,525	67,220,584	64,286,705	30,250,304	32,687,641	27,799,640	25,232,273	29,459,935
Oil - New Production[6]	—	—	—	—	—	—	97,710	473,198	1,163,730	1,193,847	2,089,843	2,961,292
Gas - Old Production[5]	7,793,174	9,554,241	10,830,283	11,976,791	14,220,097	14,771,771	14,252,700	12,379,311	9,815,142	9,751,230	8,318,912	6,572,467
Gas - New Production[6]	—	—	—	—	—	—	20,344	227,211	379,753	998,770	1,342,965	1,915,482
Total Proceeds Tax	46,755,486	67,522,485	88,466,105	90,301,958	88,335,914	96,427,632	94,352,803	57,441,679	57,545,578	53,504,449	49,451,008	54,057,300
Investor-Owned Utilities[7]	15,295,897	20,987,045	26,628,444	35,410,228	42,730,511	44,155,981	44,528,487	52,595,297	50,159,544	51,217,516	63,236,810	67,774,541
Energy Property Taxes[8]	**62,051,383**	**88,509,530**	**115,094,549**	**125,712,186**	**131,066,425**	**140,583,613**	**138,881,290**	**110,036,976**	**107,705,122**	**104,721,965**	**112,687,818**	**121,831,841**
TOTAL Property Taxes[9]	**$462,122,062**	**$486,255,938**	**$505,040,221**	**$554,089,316**	**$572,086,939**	**$586,657,893**	**$558,500,375**	**$526,706,810**	**$560,606,243**	**$542,138,877**	**$566,624,586**	**$588,834,696**

1 1992 receipts are for the twelve months ending June 30, 1992, and do not include the accruals authorized by the 1992 Special Session of the Legislature.

2 Starting in FY1992, the Department of Transportation collected aviation, diesel, and gasoline taxes.

3 Most of the tax collections reported here are earmarked for specific uses. However, all or part of the severance taxes, the Electricity and Electrical Energy License Tax (Electrical Producers Tax), and the Department of Public Service Regulation Tax are deposited in the General Fund.

4 "Total DOR Collections" is taken from the table "Department of Revenue Collections — 19xx-19xx (Fiscal Years)" from the various biennial reports. Added to the total from the reports are Oil and Gas Producers Privilege and License Tax in FY1981-90; the liquor license tax, the liquor excise tax, the beer tax, and the table wine tax in all years; and the aviation, diesel, and gasoline fuel taxes in FY1992. The Emergency Telephone 911 System Fee was subtracted from FY 1991-92.

5 Since 1989, the Local Government Severance Tax on old gas and oil is based on a percentage of gross value rather than on the local mill levy.

6 Since 1985, Net Proceeds tax on new gas and oil is based on a percentage of gross value rather than on the local mill levy.

7 Utility property tax data obtained directly from: Black Hills Power and Light Company, Idaho Power Company, Montana-Dakota Utilities Company, Montana Power Company, PacifiCorp, Portland General Electric Company, Puget Sound Power and Light Company, and Washington Water Power Company. These figures include the beneficial use tax.

8 Doesn't include property of electrical cooperatives, pipelines, refineries, mines, and other energy production facilities for which complete property tax data were not available at time of publication. In 1992, all these together generated less property tax than did property of investor-owned utilities.

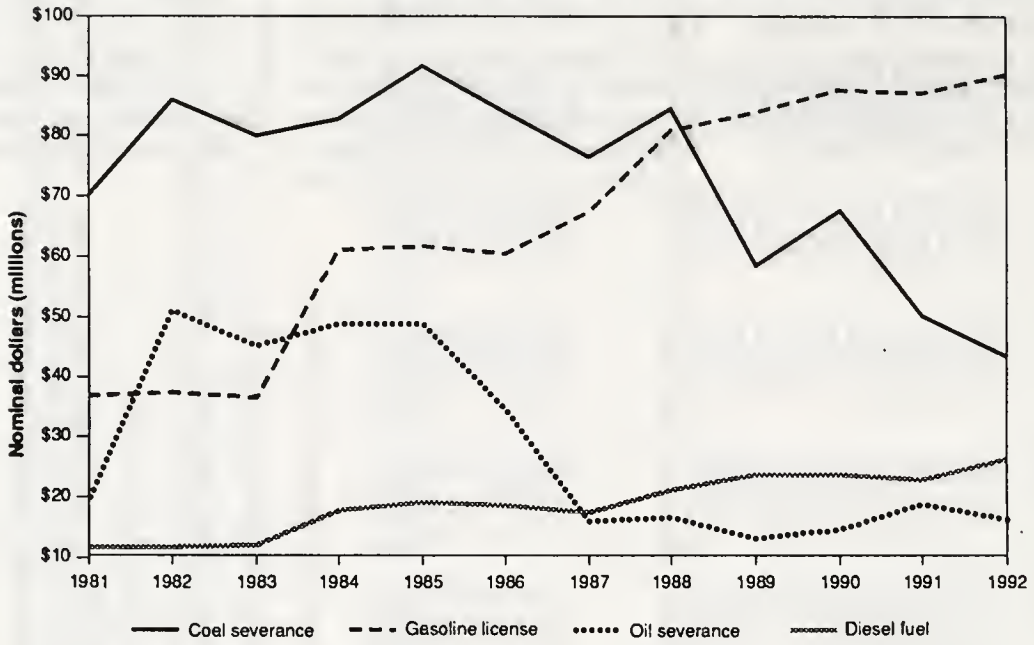
9 Includes some non-property tax collections levied on Special Improvement Districts.

NOTE: Coal, natural gas, and oil taxes are based on value of production; aviation, diesel, gasoline, and electricity taxes are based on amount of production; and Consumer Counsel and Public Service Regulation taxes are based on revenue of companies regulated by the Public Service Commission.

Changes in tax receipts reflect changes in the amounts of fuel or energy sold, changes in the price of the product, or changes in tax policy.

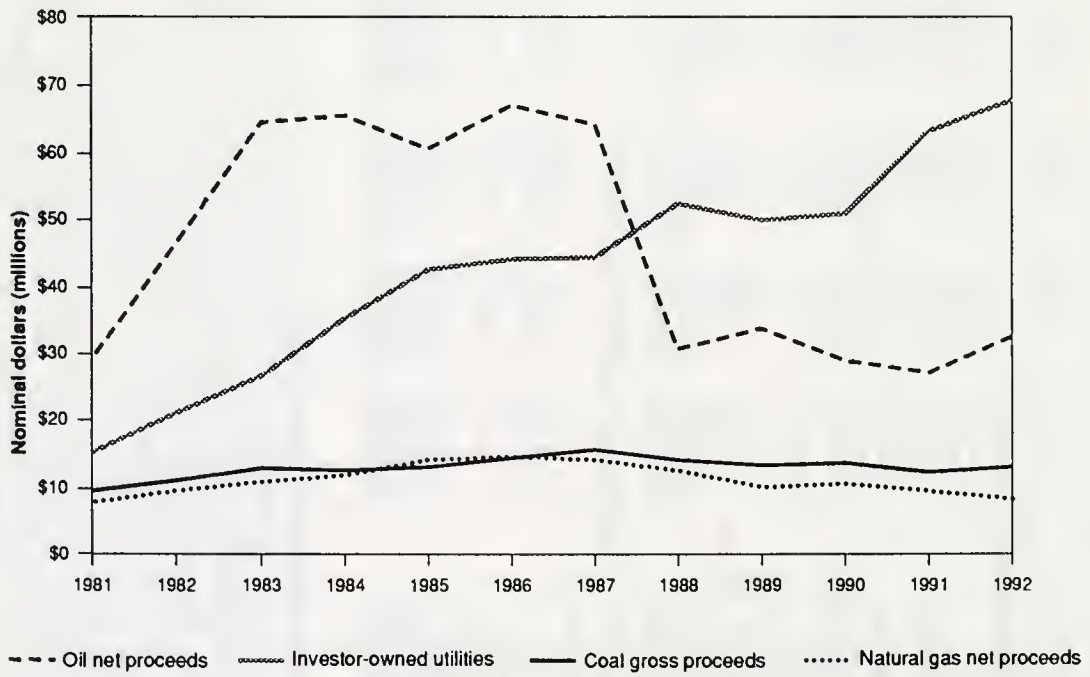
SOURCE: *Biennial Report of the Montana Department of Revenue*, 1980-92.

Figure 8.1. DOR Collections for Selected Energy Taxes, FY 1981-92



SOURCE: Table 8.1.

Figure 8.2. Selected Energy-Related Property Tax Collections, FY 1981-92



SOURCE: Table 8.1.

Table 8.2. Heating Degree Days for Selected Locations, 1961-90 Average (Base 65° F)

STATION	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Annual
Augusta	50	98	312	549	936	1,246	1,305	1,014	961	657	406	176	7,710
Belgrade Airport	49	92	341	657	1,059	1,414	1,476	1,145	1,063	705	450	195	8,646
Big Timber	18	52	263	520	879	1,150	1,203	958	899	597	344	126	7,009
Billings WSO AP	12	42	242	498	897	1,225	1,308	1,008	915	582	316	119	7,164
Birney	15	40	253	564	1,002	1,380	1,442	1,098	942	576	307	116	7,735
Boulder	71	110	361	645	1,020	1,314	1,349	1,061	1,011	714	468	220	8,344
Bozeman MSU	41	79	312	583	966	1,262	1,305	1,033	980	672	419	184	7,836
Broadus	20	49	258	583	993	1,373	1,445	1,114	977	609	322	121	7,864
Browning	135	185	420	676	1,089	1,392	1,466	1,173	1,132	798	549	298	9,313
Butte FAA AP	104	171	435	744	1,119	1,473	1,494	1,204	1,138	804	552	279	9,517
Chester	37	90	332	632	1,089	1,485	1,550	1,212	1,063	672	366	152	8,680
Choteau Airport	35	97	307	524	936	1,243	1,314	1,025	967	645	378	158	7,629
Circle	20	63	253	574	1,008	1,420	1,531	1,204	1,039	612	305	106	8,135
Colstrip	15	62	269	552	960	1,324	1,404	1,092	958	612	336	123	7,707
Columbus	15	55	263	543	936	1,265	1,324	1,014	908	594	338	130	7,385
Conrad Airport	69	119	339	601	1,026	1,355	1,420	1,109	1,026	675	394	176	8,309
Cooke City 2 W	307	366	624	939	1,311	1,643	1,659	1,375	1,364	1,080	800	513	11,981
Crow Agency	11	43	252	539	987	1,395	1,482	1,123	949	579	316	105	7,781
Culbertson	32	81	298	626	1,131	1,603	1,730	1,352	1,116	660	331	128	9,088
Cut Bank FAA AP	77	155	377	651	1,068	1,398	1,473	1,170	1,101	741	468	225	8,904
Darby	51	82	280	546	876	1,147	1,169	904	843	600	378	165	7,041
Deer Lodge 3 W	133	172	438	744	1,098	1,395	1,442	1,145	1,076	786	552	295	9,276
Dillon WMCE	54	101	322	583	960	1,262	1,280	1,008	958	672	431	192	7,823
Drummond Aviation	68	100	343	657	1,014	1,342	1,373	1,053	952	660	434	191	8,187
Ekalaka	16	65	269	570	996	1,355	1,457	1,151	1,023	627	333	125	7,987
Ennis	60	99	343	608	951	1,246	1,290	1,025	973	687	446	206	7,934
Fairfield	62	115	334	589	1,014	1,324	1,429	1,106	1,029	699	419	182	8,302
Fort Benton	18	64	272	536	951	1,305	1,380	1,061	933	576	303	120	7,519
Fork Peck Power Plant	7	40	228	505	969	1,423	1,578	1,240	1,042	591	276	85	7,984
Gardiner	26	61	266	536	945	1,265	1,293	1,019	939	639	381	159	7,529
Glasgow WSO AP	19	71	267	586	1,074	1,544	1,686	1,330	1,104	621	322	121	8,745
Glendive	6	38	238	530	1,032	1,494	1,621	1,266	1,039	582	253	79	8,178
Great Falls WSCMO AP	37	91	299	543	933	1,274	1,358	1,053	983	642	372	156	7,741
Hamilton	57	96	324	629	954	1,228	1,243	955	874	618	397	178	7,553
Hardin	13	39	213	493	906	1,268	1,339	1,025	893	525	248	104	7,066
Harlem 4 W	23	77	285	595	1,083	1,507	1,603	1,249	1,048	624	318	124	8,536
Harlowton	45	96	317	574	954	1,234	1,280	1,022	977	666	406	174	7,745
Havre WSO AP	18	70	296	595	1,062	1,476	1,572	1,229	1,051	636	325	117	8,447
Helena WSO AP	34	65	321	617	1,002	1,358	1,407	1,081	973	648	388	137	8,031
Hysham	8	34	219	493	927	1,305	1,389	1,058	902	537	266	87	7,225
Jordan	10	46	246	555	1,014	1,426	1,522	1,170	992	597	297	103	7,978
Kalispell WSO AP	97	128	367	716	1,020	1,311	1,380	1,075	970	654	425	235	8,378
Lame Deer	19	55	266	567	987	1,336	1,414	1,089	964	624	357	129	7,807
Lewistown FAA AP	75	131	355	620	987	1,314	1,392	1,120	1,070	726	468	221	8,479
Libby 1 NE Ranger Stn	44	67	258	589	915	1,209	1,252	935	831	561	332	139	7,132
Lindbergh Lake	117	155	402	716	1,059	1,336	1,376	1,086	1,042	762	515	265	8,831
Livingston FAA AP	37	69	300	524	879	1,138	1,194	955	921	636	403	164	7,220
Miles City FAA AP	5	39	228	527	987	1,420	1,519	1,168	983	570	266	84	7,796
Missoula WSO AP	65	81	303	645	978	1,290	1,311	1,002	905	624	409	179	7,792
Polson	45	66	274	583	894	1,166	1,212	946	877	594	369	155	7,181
Poplar 2 E	17	60	248	564	1,071	1,553	1,690	1,316	1,070	606	281	100	8,576
Red Lodge	73	127	369	636	996	1,262	1,314	1,075	1,045	738	481	235	8,351
Roundup	11	44	241	493	906	1,218	1,280	980	893	558	289	97	7,010
Saint Ignatius	60	76	289	605	915	1,187	1,225	949	856	579	360	153	7,254
Sidney	19	56	259	567	1,047	1,494	1,612	1,263	1,051	600	284	97	8,349
Stevensville	57	84	305	626	942	1,234	1,240	949	856	594	378	161	7,426
Superior	37	61	247	558	885	1,172	1,187	896	803	555	341	142	6,884
Swan Lake	124	153	387	694	1,005	1,283	1,324	1,028	952	669	446	243	8,308
Terry	14	58	271	605	1,050	1,479	1,606	1,260	1,054	630	306	108	8,441
Thompson Falls P H	34	59	236	546	876	1,138	1,175	890	794	528	310	124	6,710
Townsend	41	86	306	570	918	1,234	1,296	1,005	905	603	366	160	7,490
Troy	60	78	278	605	921	1,190	1,237	952	865	585	366	150	7,287
Valier	54	110	330	570	993	1,321	1,392	1,098	1,032	687	412	183	8,182
Virginia City	88	132	375	648	1,014	1,299	1,321	1,072	1,045	750	502	246	8,492
Westby	22	95	334	673	1,191	1,693	1,841	1,476	1,246	726	355	124	9,776
West Yellowstone	170	243	525	862	1,254	1,634	1,646	1,344	1,283	960	663	372	10,956
Wisdom	214	280	537	837	1,185	1,528	1,562	1,302	1,252	909	651	372	10,629

SOURCE: U.S. Department of Commerce, National Oceanic and Atmospheric Administration, *Monthly Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1961-90: Montana*

Table 8.3. Residential Fuel Choice and Type of Heating Equipment, 1960-90

	1960	1970	1980	1990	1960	1970	1980	1990
	(number of housing units)				(percentage of total)			
HOUSE HEATING FUEL (occupied housing units)								
Utility gas	123,435	151,104	172,866	166,067	61.0 %	69.5 %	60.9 %	54.2 %
Bottled, tank, or LP gas	10,533	18,503	21,055	22,986	5.2	8.5	7.4	7.5
Electricity	2,708	8,464	41,423	54,856	1.3	3.9	14.6	17.9
Fuel oil, kerosene, etc.	38,444	29,850	19,144	12,649	19.0	13.7	6.7	4.1
Coal or coke	14,036	4,531	2,811	2,399	6.9	2.1	1.0	0.8
Wood	11,700	4,113	25,817	44,966	5.8	1.9	9.1	14.7
Solar energy				185				0.1
Other fuel	1,241	720	543	1,662	0.6	0.3	0.2	0.5
No fuel used	143	19	83	393	0.1	*	*	0.1
TOTAL	**202,240**	**217,304**	**283,742**	**306,163**	**100.0**	**100.0**	**100.0**	**100.0**
WATER HEATING FUEL (occupied housing units)								
Utility gas	109,726	134,503	158,821		54.3	61.9	56.0	
Bottled, tank, or LP gas	6,933	10,704	16,786		3.4	4.9	5.9	
Electricity	60,179	64,323	103,590		29.8	29.6	36.5	
Fuel oil, kerosene, etc.	2,058	726	1,028		1.0	0.3	0.4	
Coal or coke	1,580	124			0.8	0.1		
Wood	2,506	652			1.2	0.3		
Other	428	145	1,153		0.2	0.1	0.4	
No fuel used	18,830	6,127	2,364		9.3	2.8	0.8	
TOTAL	202,240	**217,304**	**283,742**		**100.0**	**100.0**	**100.0**	
HEATING EQUIPMENT (year-round housing units)								
Steam or hot water system	24,747	27,106	34,062		10.6	11.3	10.8	
Central warm-air furnace[1]	86,355	123,529	158,567		37.0	51.3	50.3	
Electric heat pump			5,057				1.6	
Other built-in electric units	2,790	7,317	32,854		1.2	3.0	10.4	
Floor, wall, or pipeless furnace	30,080	22,602	15,624		12.9	9.4	5.0	
Room heaters with flue[2]	84,075	42,095	28,664		36.0	17.5	9.1	
Room heaters without flue[3]	3,451	5,532	7,189		1.5	2.3	2.3	
Fireplaces, stoves, or portable room heaters		11,831	32,060			4.9	10.2	
None	1,779	743	1,021		0.8	0.3	0.3	
TOTAL	233,277	**240,755**	**315,098**		**100.0**	**100.0**	**100.0**	

* Less than 0.05 percent

[1] In 1960 and 1970, this category was defined as "Warm air furnace."

[2] In 1960, this category was defined as "Other means with flue."

[3] In 1960, this category was defined as "Other means without flue."

NOTE: Information was not collected in some categories in some years.

SOURCES: U.S. Department of Commerce, Bureau of Census, *Census of Housing* (1960-90).

Table 8.4. Economic Indices

Year	Consumer Price Index for all Urban Consumers (1982-84 = 100) Average Index	Implicit Price Deflator (1987 = 100)	Consumer Price Index (1991 dollars)	Implicit Price Deflator (1991 dollars)
1954	26.9		19.8	
1955	26.8		19.7	
1956	27.2		20.0	
1957	28.1		20.6	
1958	28.9		21.2	
1959	29.1	25.6	21.4	21.7
1960	29.6	26.0	21.7	22.1
1961	29.9	26.3	22.0	22.3
1962	30.2	26.9	22.2	22.8
1963	30.6	27.2	22.5	23.1
1964	31.0	27.7	22.8	23.5
1965	31.5	28.4	23.1	24.1
1966	32.4	29.4	23.8	25.0
1967	33.4	30.3	24.5	25.7
1968	34.8	31.8	25.6	27.0
1969	36.7	33.4	26.9	28.4
1970	38.8	35.2	28.5	29.9
1971	40.5	37.1	29.7	31.5
1972	41.8	38.8	30.7	32.9
1973	44.4	41.3	32.6	35.1
1974	49.3	44.9	36.2	38.1
1975	53.8	49.2	39.5	41.8
1976	56.9	52.3	41.8	44.4
1977	60.6	55.9	44.5	47.5
1978	65.2	60.3	47.9	51.2
1979	72.6	65.5	53.3	55.6
1980	82.4	71.7	60.5	60.9
1981	90.9	78.9	66.7	67.0
1982	96.5	83.8	70.9	71.1
1983	99.6	87.2	73.1	74.0
1984	103.9	91.0	76.3	77.2
1985	107.6	94.4	79.0	80.1
1986	109.6	96.9	80.5	82.3
1987	113.6	100.0	83.4	84.9
1988	118.3	103.9	86.9	88.2
1989	124.0	108.5	91.0	92.1
1990	130.7	113.2	96.0	96.1
1991	136.2	117.8	100.0	100.0

NOTE: For half the years in this period, the Implicit Price Deflator showed a greater rate of inflation than did the Consumer Price Index. However, the cumulative difference between the indices at any point in this period was minor.

SOURCES: Consumer Price Index: U.S. Bureau of Labor Statistics and Montana Department of Labor and Industry.
Implicit Price Deflator: U.S. Department of Commerce, Economics and Statistics Administration, November 1992.

200 copies of this public document were published at an estimated cost of $7.00 per copy, for a total cost of $1,400.00 which includes $1,400.00 for printing and $.00 for distribution.

This document printed on recycled paper.